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JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

JULY 1961

DR. ABNER BRENNER
1961 AES SCIENTIFIC ACHIEVEMENT AWARD WINNER

PLATING MAGAZINE

AMERICAN ELECTROPLATERS SOCIETY

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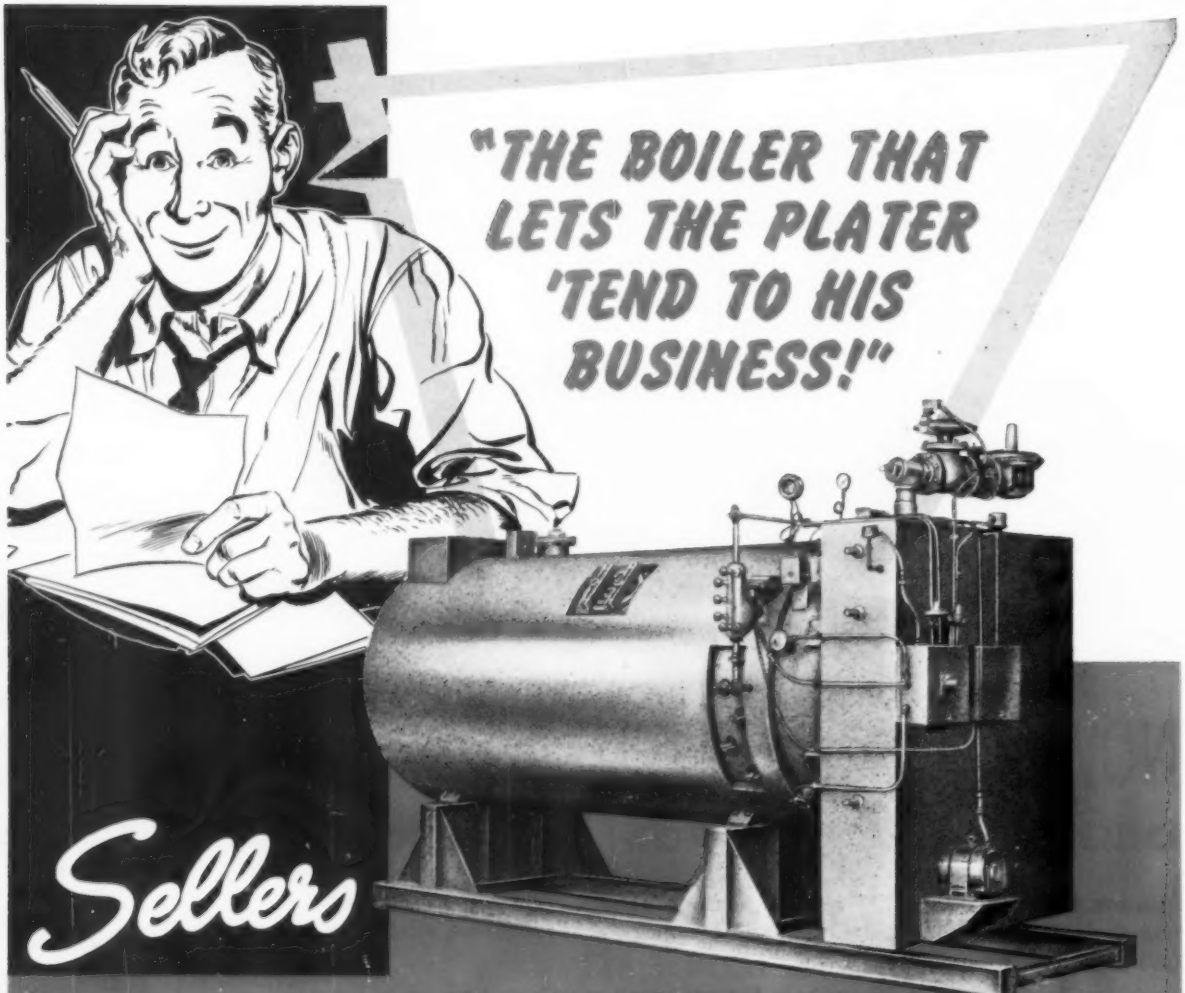

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JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

JULY 1961 — AUDITED PAID CIRCULATION ABC — **Vol. 48, No. 7**

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Published by American Electroplaters' Society, Inc. (AES), American Building, 443-445 Broad Street, Newark 2, New Jersey. Phone HUmboldt 2-3400.

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We as inhabitants of this Earth are living today in an era of paradoxes. Though we of the great Earth planet are making unprecedented progress in conquering the vast distances to outer space and to eventual interplanetary exploration and communication, we have nevertheless fallen short to date in conquering our own baffling international stresses and strains, and achieving a harmonious, peaceful and effective state of personal relations with one another.

This is indeed the hey-day of Science in all parts of our globe, particularly in our own great country in this early stage of our so-styled "New Frontier".

"Knowledge is Power" durably said Francis Bacon at the turn of the Seventeenth Century, and never was that truer than in our respective daily lives in these paradoxical threshold days of our "Space Age". There is, therefore, timely urgency for gaining and harnessing "Knowledge" in all fields of our planet's enterprise, including, of course, in electroplating, metal finishing and allied arts.

In our particular field, half-century-old American Electroplaters' Society, our own educational agency, consequently faces an even greater challenge ahead in the stimulation of knowledge in plating, metal finishing and allied arts beneficial to the multitudes of men and women who, as members, belong to it. Indeed, to meet this present challenge, our aim must be to make scientific strides parallel to those of other scientific fields, and be ready unselfishly to offer our knowledge where and when needed.

With deep appreciation for the honor and privilege that AES members have vested in me by election to their Society's Presidency, our administration will bend every possible effort that AES, in radiating knowledge in the arts and sciences of electroplating, metal finishing and allied arts ever more widely, may keep apace of the forward scientific sweep of our nation's "New Frontier".

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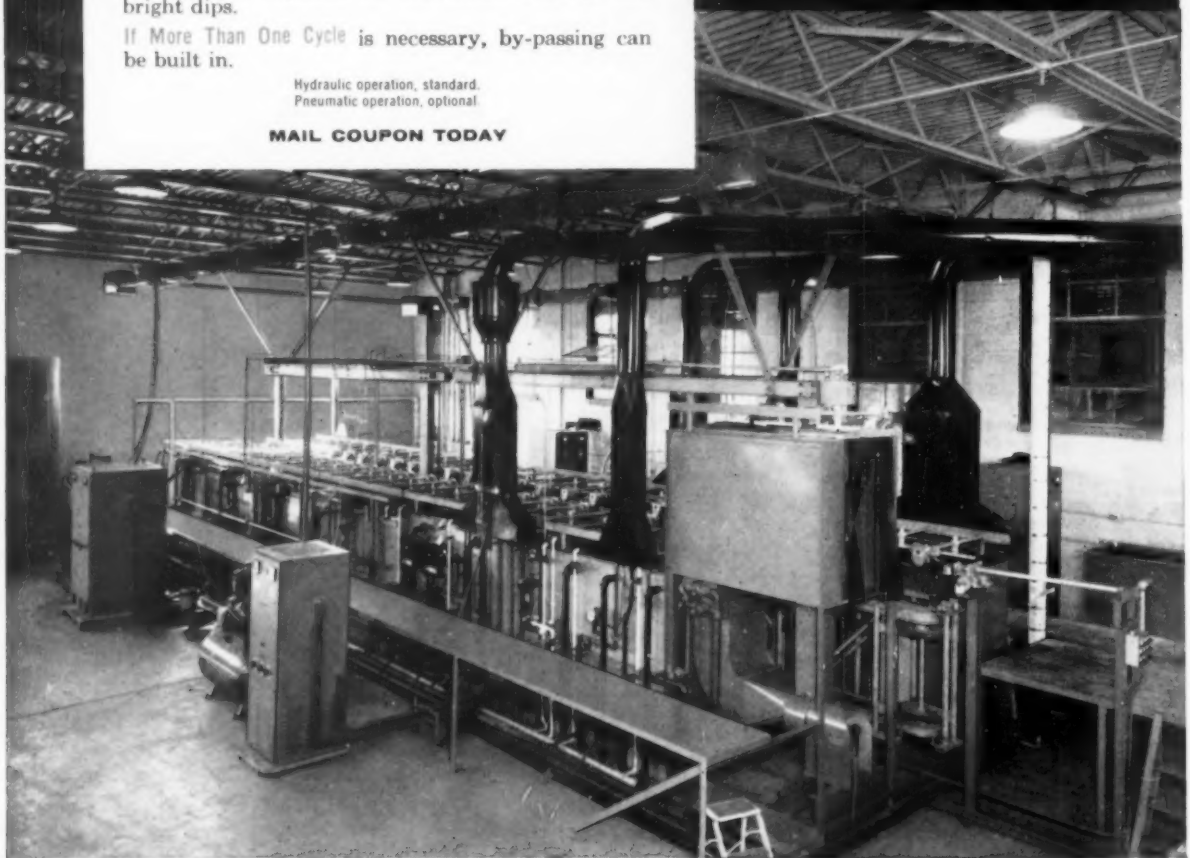

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a. *RECENT DEVELOPMENTS IN THE ELECTRODEPOSITION OF ZINC AND CADMIUM.*
T. E. Such.
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60. CHROMIUM

a. *THEORY AND PRACTICE IN CHROMIUM PLATING.*
J. Nugent.
Electroplating and Metal Finishing, April 1961, *14*, No. 4, pp. 131–132.

b. *CHROME PLATING HIGH-LOADED COMPONENTS.*
Larissa Domnikov.
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61. CLEANING

ULTRASONIC CLEANING: ITS THEORY AND SOME FACTORS AFFECTING ITS APPLICATION.
Richard W. Thomas.
General Motors Engineering Journal, April–May–June 1961, pp. 23–28.

62. CONTROL

a. *COMPLEXOMETRIC METHOD FOR DETERMINING THICKNESS OF CHROMIUM PLATE ON STEEL.*
M. R. Verma, K. C. Agrawal and J. S. Bahl.
Electroplating and Metal Finishing, April 1961, *14*, No. 4, pp. 119–122.

b. *FINISHING TO GOVERNMENT SPECIFICATIONS.*
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c. *MEASURING PLATING THICKNESS—INDUSTRIAL APPLICATIONS OF X-RAY METHODS.*
R. H. Zimmerman.
Metal Finishing, May 1961, *59*, No. 5, pp. 67–73.

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b. *DETECTING AND MEASURING CORROSION USING ELECTRICAL RESISTANCE TECHNIQUES.*
D. Roller and W. R. Scott.
Corrosion Technology, *8*, No. 3, pp. 71–76.

c. *TV AID IN PIPELINE CORROSION DETECTION.*
Corrosion Technology, *8*, No. 3, pp. 78–79.

64. MISCELLANEOUS

a. *NICKEL-CHROMIUM PLATING TO SPECIFICATION REQUIREMENTS.*
D. J. Bouckley.
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b. *ELECTROCHEMICAL MACHINING.*
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c. *A DISCUSSION ON THE OUT-OF-ROUNDNESS OF MACHINED PARTS AND ITS MEASUREMENT.*
Earl E. Lindberg.
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65. NICKEL

SCIENCE FOR ELECTROPLATERS—65. VARIABLES IN THE WATTS BATH.
L. Serota.
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a. *SYNTHETIC RESINS—PART VIII—STYRENE—BUTADIENE COPOLYMERS.*
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♦

The AES was welcomed to California and Los Angeles by Governor Edmund G. Brown and by Mayor Norris Poulson. The entire week of the AES's Convention was, in fact, proclaimed by Los Angeles Mayor as "American Electroplaters' Society Week in Los Angeles."

♦

Educational Sessions numbered nine. Experts presented 31 technical and scientific papers enriching knowledge in electroplating, metal finishing and allied arts. One Session alone covered organic finishing.

High spots of the Sessions were not only the second annual "William Blum Lecture" that was delivered as the Educational Program's lead-off attraction by Dr. A. Kenneth Graham, 1959 winner of the "AES Scientific Achievement Award", the Society's highest scientific honor, but also the vaunted two-session, eight-paper "Hydrogen Embrittlement in Metal Finishing Symposium." In addition, this Convention also featured the summary of AES Research Projects presented by AES Research Committee Chairman James D. Thomas at one of the Sessions.

♦

Under the active planning and supervision of the AES's Editorial Board itself, the Educational Sessions were programmed for the AES by Host Branch Educational Chairman Earl W. Arnold and his Co-Chairman, David F. Seymour, with Dr. Harold J. Read of Pennsylvania State University, a special member of that Los Angeles Branch Committee, responsible for the "Hydrogen Embrittlement in Metal Finishing Symposium."

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Professor of Physical Metallurgy, The Pennsylvania State University, University Park, Pennsylvania

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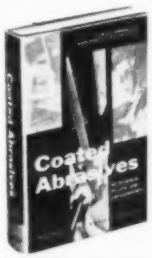

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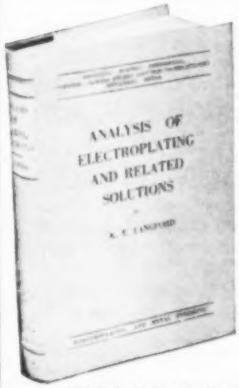

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The unique book contains the full text of each of the 43 technical papers on electroplating, metal finishing, organic coating and allied arts by experts of nine countries, including the United States, England, Canada, Australia, France, Germany, Holland, India and Italy, delivered before the Fifth International Conference on Electrodeposition and Metal Finishing, educational sessions element of the AES's Golden Jubilee Convention held in Detroit, Michigan, June 15–19, 1959.

Spanning some 400 pages (by far the largest annual TECHNICAL PROCEEDINGS ever published by the AES in its half-century lifetime), this 1959 edition also includes, among other data, a day-to-day log of the Golden Jubilee Convention; a section on the AES Scientific Achievement Award and on other AES technical and scientific awards and honors bestowed at the Golden Jubilee Convention; a full listing of the Boards and Standing and Special Committees that served the AES during its Fiftieth Anniversary year, and a complete AES Branch Directory.

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GREETED by the President of the United States, the AES was welcomed to Michigan and Detroit by Governor G. Mennen Williams. The entire week of the AES's Convention, Exposition and International Conference was proclaimed by Detroit's Mayor as "AES GOLDEN JUBILEE WEEK IN DETROIT."

AS the Fifth International Conference on Electrodeposition and Metal Finishing, the Golden Jubilee Convention's educational sessions numbered eleven. Experts from nine countries, including the United States, England, Canada, Australia, France, Germany, Holland, India and Italy, presented 43 technical and scientific papers enriching knowledge in electroplating, metal finishing and allied arts. High spot of the sessions was the first "William Blum Lecture" that was delivered by the eminent Dr. William Blum, first winner of the AES Scientific Achievement Award, the Society's highest honor.

UNDER the supervision of the AES's Editorial Board, in collaboration with the International Council on Electrodeposition and Metal Finishing, the International Conference was planned for the AES by AES Past President Walter L. Pinner, Chairman of the International Council. His Committee included Dr. T. P. Hoar, Dr. Simon Wernick, A. W. Wallbank, R. A. F. Hammond and George Gardam of England and Myron B. Diggin, Dr. Walter R. Meyer and Dr. Richard B. Saltonstall of the United States.

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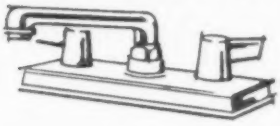
This is LECTRITE 'Z' ...the new electrocleaner that removes all dulling films from all zinc die-cast alloys. Use it for side-view mirrors or refrigerator handles . . . plumbing fixtures  or furniture hardware. You'll get streak-free, shadow-free plating every time!

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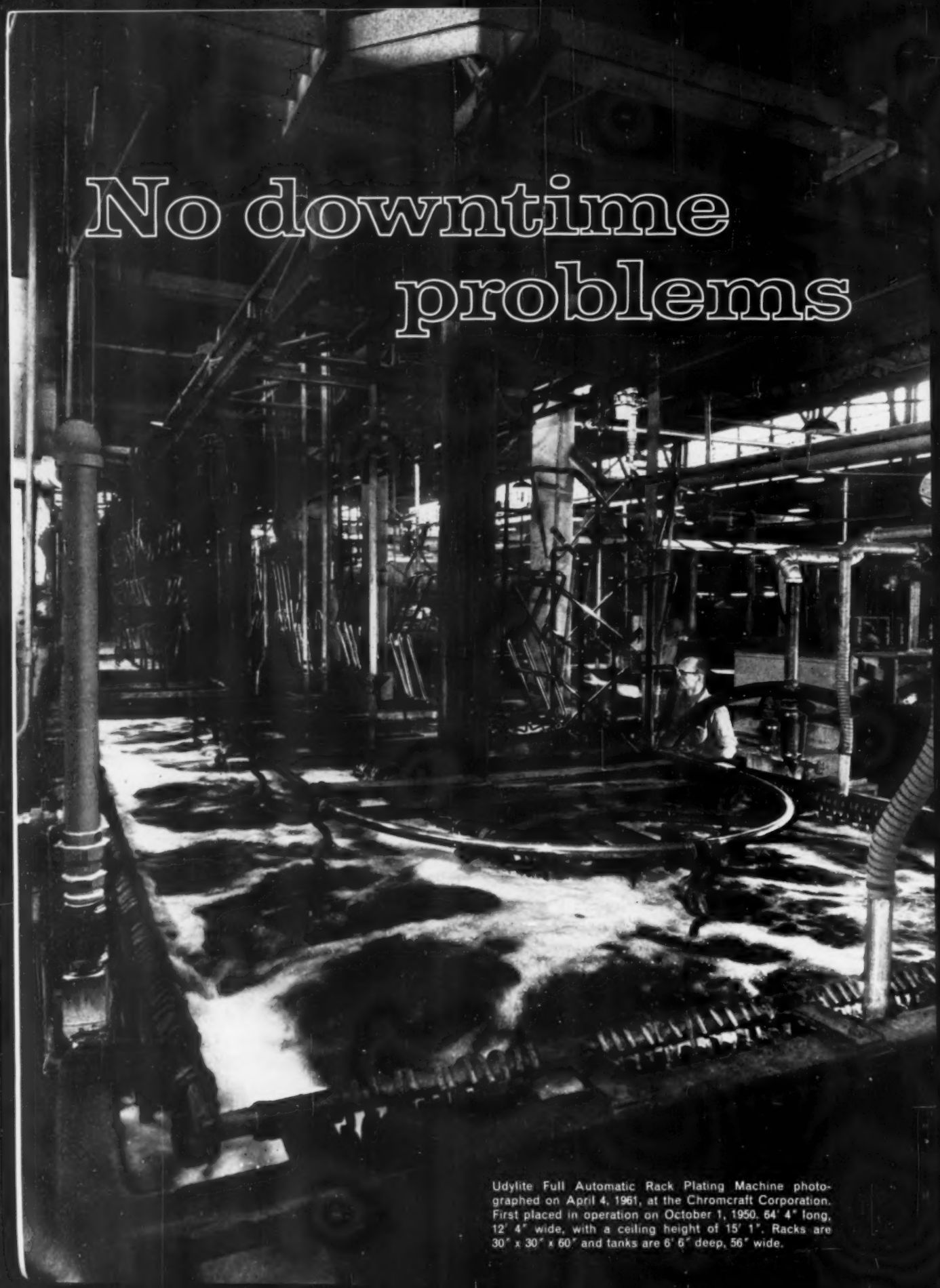

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L—702 ANODES—"Platinum-ized" titanium mesh anodes, trademarked Platanium, which are reported to give solid platinum anode efficiency and quality performance at 1/5th the cost, are described in new booklet by Sel-Rex Corporation.

The illustrated technical data suggests uses and applications for this type of insoluble anode, which is said to be used extensively in applications ranging from platinum electroplating and electrochemical processing to refining catalysts and marine cathodic corrosion-protection. The special diamond-configuration design affords maximum anode area while cutting down overall size at least 50 per cent according to the booklet.

L—703. ELECTRIC IMMERSION HEATING ELEMENT—A data sheet has been made available by Electro-Term describing the new Twist-O-Seal, water heater element and thermostat assembly. Adaptable to either glass or galvanized tanks, it is claimed that no bolts, nuts or tapped holes are needed to mount this thermostatically controlled electric heating element in water tanks.

L—704. BOILERS—New Brochure No. 6010-A illustrates and describes features of Sellers new Model 15 Commodore immersion hot water heating boilers. Nine standard models are available. Utilizing the immersion boiler design in hot water space heating eliminates serious tube joint problems due to thermal shock arising from rapid temperature changes in the return water. Other features of the Model 15 are quicker control response, reduced pick up load, more rapid internal circulation; also more thorough mixing of supply and return water.

L—705. ANODES—Anodes for high speed chromium plating employing the new HS-32 lead alloy developed by Heil Process Equipment engineers specially for use with the new high speed fluoride-ion chromium plating solutions are described in Bulletin No. B-4660. The complete description includes prices of four diameters and 30 standard lengths.

L—706. ALUMINUM ALLOY PLATING PREPARATION—A new process for preparing aluminum alloys for electroplating which can be used to plate all commonly electroplated metals on all aluminum alloys is fully described in Technical Data Sheet No. 13, a six-page usage and instruction sheet prepared by MacDermid Incorporated.

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strike. No special skills are required, since all the steps in the process call for ordinary plating room techniques.

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L—707. PLATING BRIGHTENERS AND SOLUTIONS—Nickel, zinc and cadmium brighteners for efficient and economical bright still or barrel plating are described in a series of four free technical booklets by the Chemical Division, The Meaker Company, subsidiary of Sel-Rex Corporation.

Details on economical production of brilliant deposits directly from the bath, maximum throwing power, and elimination of subsequent bright dips are given for each process in the series. Also shown are: bath composition; operating data and instructions; maintenance; consumption figures; and special notes peculiar to the particular process.

L—708. METAL CLEANING—Turco Products, Inc. has released a new, comprehensive 12-page metal finishing brochure titled "Specialized Chemical Processing Compounds for the Metalworking Industry." This illustrated booklet contains specific information for the use of each of the 43 products that make up the company's standard line of cleaning and processing compounds.

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L—709. FLOODED-BED SCRUBBER—The Air Pollution Control Division, John Wood Company, has announced the development of a newly improved flooded-bed scrubber. Engineering refinements are claimed to have improved the capability of this concept in scrubber design to remove extremely toxic and corrosive contaminants. The flooded bed scrubber is now available in rated capacities from 200 to 5,000 cfm and larger in combination.

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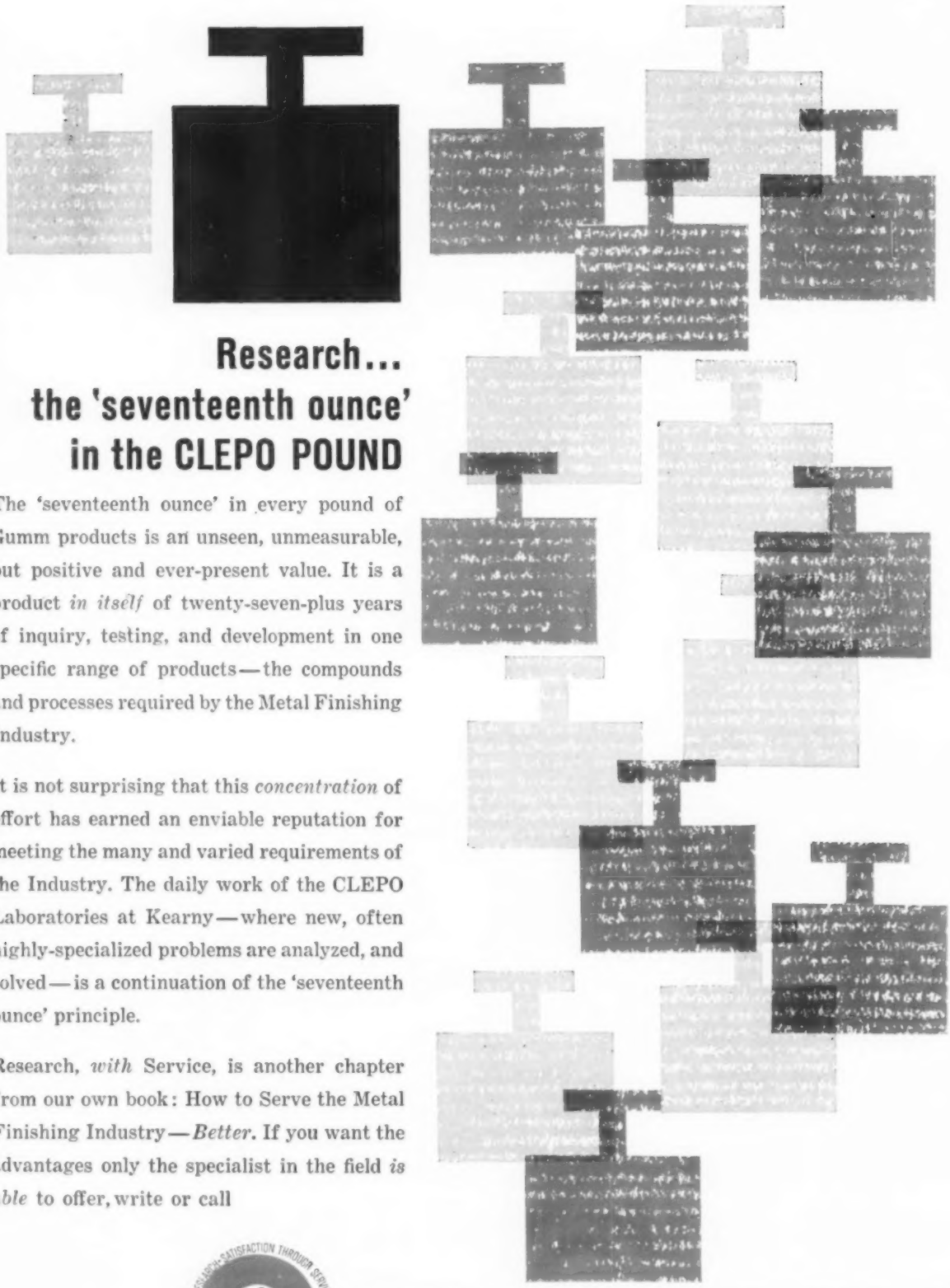

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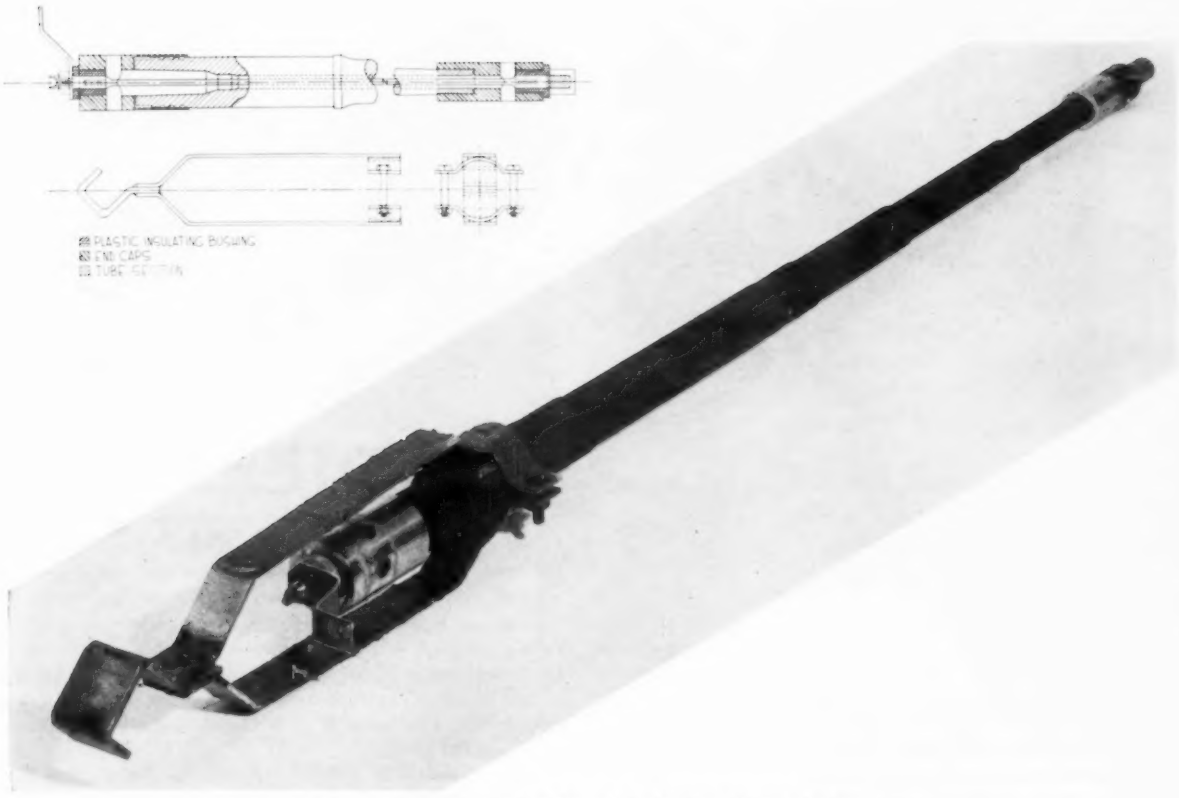

Fig. 1. Conventional type of fixture for chromium plating tube bores.

CIRCUMFERENTIALLY UNIFORM ELECTROPLATING OF TUBE BORES

by JOHN P. YOUNG and HARRY I. SALMON*

ABSTRACT

New procedures for plating the internal surface of tubes are described. Data are presented giving the degree of circumferential uniformity of thickness of deposits of chromium obtained with newly designed fixtures. The best procedure, in which a rotating anode was centered and insulated by a spirally wound rod of polyvinyl-chloride, resulted in deposits that deviated from uniformity by only two per cent of the average thickness. The gun tubes used in this study had an inside diameter of 0.3 inch and a bore length of 20 inches.

1. INTRODUCTION

LARGE NUMBERS OF GUN TUBES have been chromium plated in the bore to extend their life and improve their performance.[1–5] For attainment of maximum benefits from the chromium plate, it is necessary that the deposits be concentric with the bore, that is, circumferentially uniform in thickness. To achieve this for various tubes ranging in internal diameter from about 0.3 to 0.8 inch, the central electrode must be concentric with the bore of the tube to within 0.002 to 0.005 inch, respectively. Prior to the present study, the method used is represented by the plating fixture shown in Fig. 1. Steel caps, which fit over each end of the tube, have a plastic insert which supports, centers and insulates the internal electrode. Holes in the sides of the caps allow circulation of gas and solution through the hollow center, or bore extension of the caps, and thus through the tube. Good results can be obtained with this type of fixture. However, due to relatively large variations of the outside diameter of the ends of tubes of a particular model, it is impossible to make a fixture of this type which will fit all tubes satisfactorily. Furthermore, under production conditions the end-caps and insulating bushings become worn and damaged through repeated use, with the resultant failure to obtain the desired concentricity of the deposit.

We therefore undertook the devising of improved procedures that would be free of the above limitations (See Table I). Four fixtures representing two improved procedures have been constructed and tested. The tubes used had a diameter of 0.3 inch and a bore-length of 20 inches. These procedures are described because of their applicability

* Metallurgy Division, National Bureau of Standards, Washington 25, D. C.

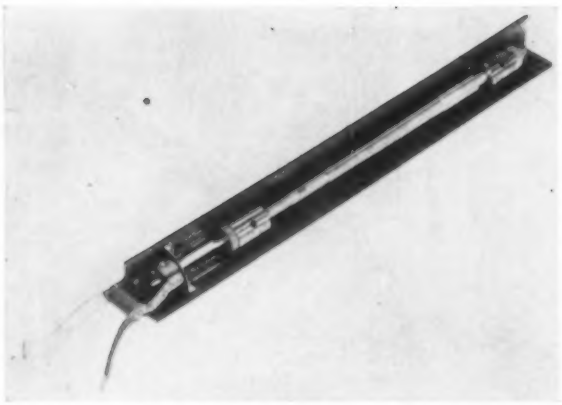

Fig. 2. Inside-conical fixture with tube in place.

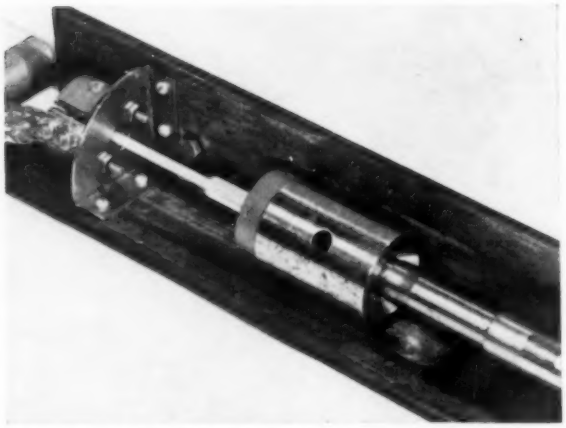

Fig. 3. Anode connector and top fitting of inside-conical fixture.

to the internal plating of tubes in general, for various commercial uses.

2. DESIGN OF FIXTURES FOR NEW PROCEDURES

As described in the introduction, conventional fittings depend on the outside surfaces of the tube for end-cap and thus anode alignment and centering. This dependence on tube surfaces was eliminated in two types of fittings by using a carefully machined separate support for positioning the end fittings. Rotation of the tube avoids the necessity for exact centering of the anode and for an absolutely straight anode. An anode with an insulating and centering spacer attached to it and bearing on the inside of the tube further simplifies fixture design. Such an anode must be moved to avoid shading areas of the tube bore opposite the spacer.

2.1 Separate Fixture Support Method

2.1.1 Inside-conical fixture

The first new design, called the inside-conical fixture, (see Figs. 2 and 3) eliminated several of the difficulties encountered with standard fittings. To eliminate dependence on the outside surface of the tube being smooth and parallel to the bore for fixture alignment, the end fittings were mounted on a piece of angle iron with accurately milled contact surfaces for support and alignment. Lack of centering of the anode due to variation in the outside diameter from one tube to another was eliminated by using conical instead of cylindrical openings in the fittings that bear on the ends of the tube. The seat for the insulator bushing was also made conical with a matching conical surface on the insulator. This design makes it impossible for the insulator to stick in its seat as may occur with the close cylindrical fit necessary in the conventional fixture. Bending of the anode by the weight of heavy electrical connectors was avoided by using a flexible connector between an insulated mount on the fixture hook and the anode.

2.1.2 Outside-conical fixture

The second design, very similar to that of the inside-conical fixture is called the outside-conical design. A fixture made according to this design is shown in Figs. 4 and 5. The only difference between this and the previous type of fixture is that in this an outside cone supports the tube by bearing on the radius or chamfer at each end of the bore. Thus, in addition to the sources of trouble eliminated in the first design, poor centering caused by eccentricity between the bore and the outside of the tube is eliminated.

2.2 Component Rotation Methods

2.2.1 Rotating-tube fixture

Concentricity of the deposit in tubes plated using the fixtures of the designs described above in Section 2.1 was

TABLE I

SOURCES OF PLATE ECCENTRICITY WHICH ARE ELIMINATED BY PLATING FIXTURES OF THE NEW DESIGNS

Eliminates:	Conventional	Inside conical	Outside conical	Tube-rotating	Anode-rotating
1. Centering of fittings on outside of tube	No	No	Yes	No	Yes
2. Alignment of fittings on outside of tube	No	Yes	Yes	Yes	Yes
3. Exact positioning of anode by fittings	No	No	No	Yes	Yes
4. Separate fittings for each type of caliber .30 tube	No	Yes	Yes	No	Yes
5. Effects of crooked bore	No	No	No	No	Yes
6. Effects of bent anode	No	No	No	Yes	Yes
7. Effects of eccentricity of bore with outside of tube	No	No	Yes	No	Yes
8. Variations in outside diameters of tube	No	Yes	Yes	No	Yes

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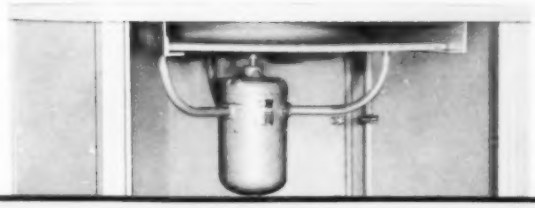

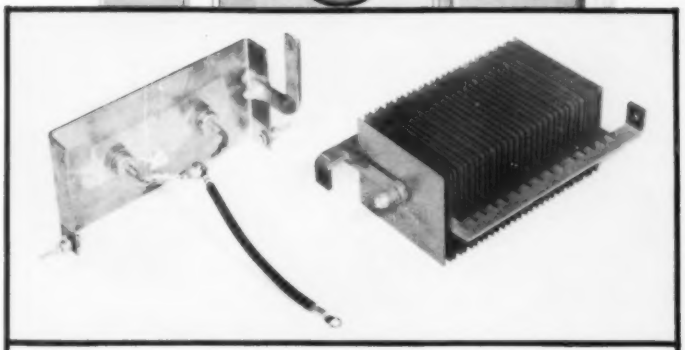

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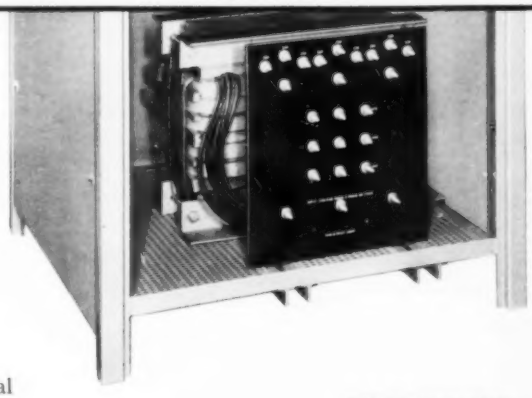

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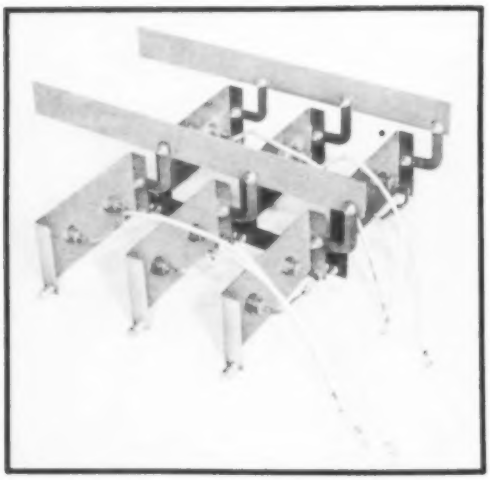

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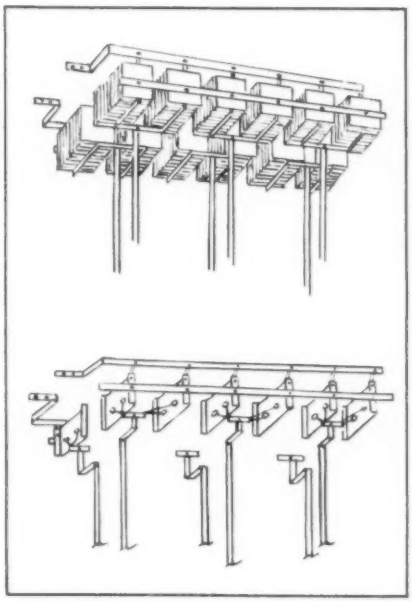

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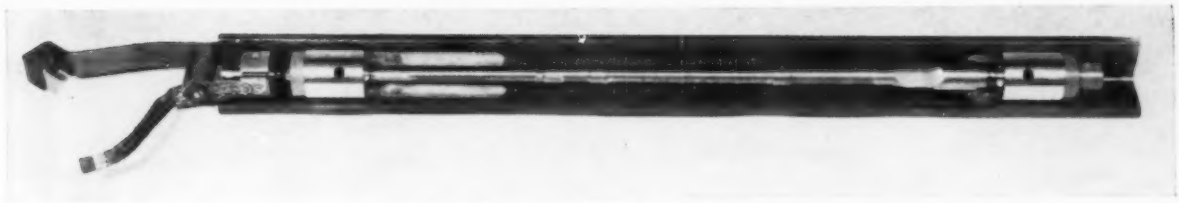

Fig. 4. Outside-conical fixture with tube in place.

quite good, but further improvement was sought. One of the major causes of eccentric deposits is bent anodes. Enough tension cannot be applied to an anode to straighten it fully once it has been kinked or bent. To counteract this difficulty, a fixture was designed and constructed which rotated the

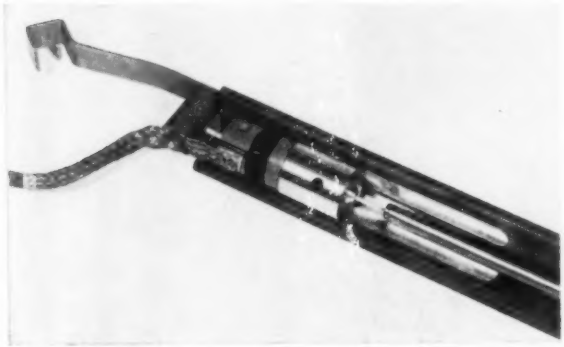

Fig. 5. Top fitting of outside-conical fixture with tube withdrawn slightly to show centering cone.

tube during deposition of chromium. This fixture is shown in Fig. 6. As in the cone-type fixtures, the supporting bearings for the tube were aligned by bolting them to a piece of angle iron. The top fitting was made in two parts. The outer part, which served as a bearing (C), was bolted to the angle iron. The inner part at its lower end (A) fitted over the tube and was clamped to the tube with a set-screw. The circulation of the plating solution was straight up through the lower fitting, through the tube, and out holes (B) provided in the top fitting. The upper end was fitted with a ratchet wheel (D). A solenoid actuated a lever bearing on the ratchet wheel which turned the inner part and the tube. A speed of approximately ten revolutions of the tube per hour was used.

2.2.2 Rotating-anode fixture

A fourth fixture was designed which gave better deposit concentricity than either the cone-type or rotating-tube fixtures. This forth fixture was simpler in design and use than any of the three described previously. The fixture, referred to as the rotating-anode type, is shown in Figs. 7 and 8. With this fixture the upper end of the tube is clamped in a socket which is attached to one end of a metal strap. A hook to fit the cathode bar was formed at the other end of the strap. A bearing made from an insulating plastic resin* is mounted midway on the strap in approximate alignment with the socket that holds the tube. This bearing supports a flexible drive shaft, to which the anode was attached. The lead-plated steel anode was wrapped spirally with about three turns of polyvinyl-chloride rod, fastened at each end of the anode. The diameter of the anode plus the spirally wrapped

* Teflon was used in this case.

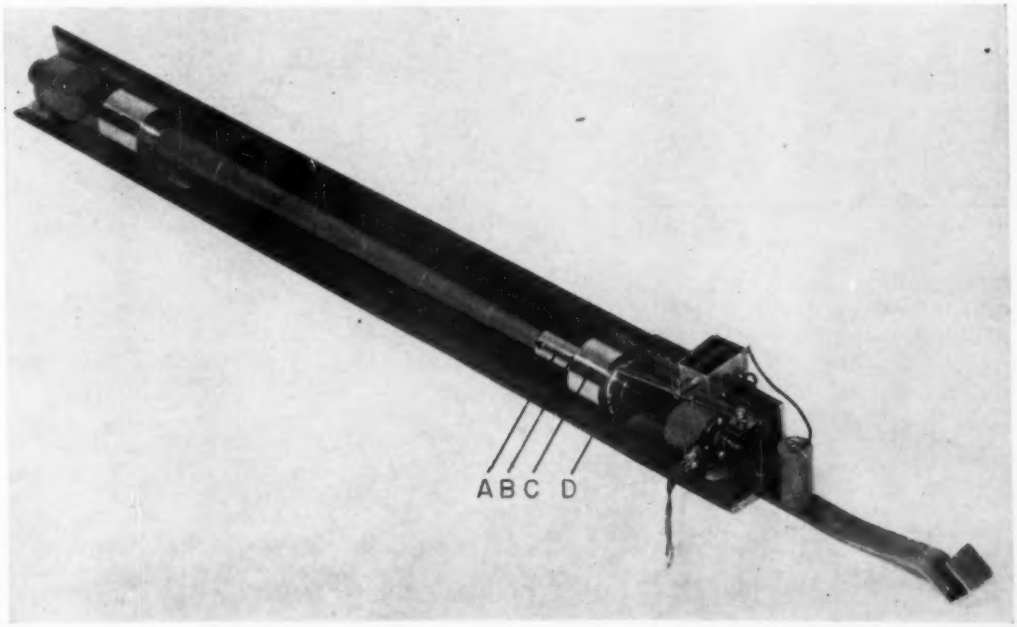

Fig. 6. Rotating-tube fixture.

Fig. 7. Rotating-anode fixture showing flexible drive shaft (right) for turning anode.

plastic rod was the same as the inside diameter of a plated tube. The anode was rotated during the plating of the tube by a small electric motor connected to the end of the flexible shaft. The speed of rotation was varied from 8.6 to 120 rpm. The direction of rotation of the anode was such that the spiral insulator tended to pump chromic acid plating solution up through the tube. The plastic anode insulator-spacer showed no visible wear after it had been used during the plating of tubes for more than 30 hours.

3. RESULTS OF PLATING TESTS

The uniformity of deposits in tubes plated with fixtures of conventional design vary considerably for the reasons mentioned in the introduction to this paper. It is not unknown for a tube to have no plate on one side and double the intended thickness on the opposite side, while the deposit in another tube plated with the same fixtures is very nearly uniform. Because of this wide variation, it was impractical to obtain the data required for direct comparison of tubes plated with conventional fixtures and those plated with the fixtures described above.

Table I makes a comparison of the new procedures on the basis of the elimination of difficulties usually encountered using tube plating fixtures of conventional design. Data on the circumferential uniformity of chromium are given in Table II. Since only the rotating-anode fixture eliminates all the difficulties listed in Table I, it is not surprising that it gave by far the most uniform deposits. The lowest speed of anode rotation (8.6 rpm) gave the best results.

The concentricity of a chromium deposit was determined

TABLE II

CIRCUMFERENTIAL VARIATIONS IN THICKNESS OF CHROMIUM PLATE ON CROSS-SECTIONS OF CALIBER .30 TUBE BORES SHOWN AS THE PER CENT VARIATION FROM AN AVERAGE THICKNESS OF 0.003 INCH

Type of Fixture	Per cent Variation
Inside-conical	8.4
Outside-conical	7.4
Tube-rotating—10 rph	4.6
Anode-rotating—60 rpm	3.3
8.6 rpm	2.0

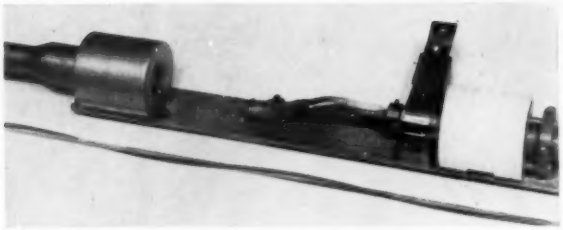

Fig. 8. Top fitting of rotating anode fixture (left), universal joint for coupling the flexible drive shaft to the anode, and silver-faced brush for applying current to anode. Anode with spiral insulator-spacer is in foreground.

by measuring its thickness with a microscope on polished cross-sections of the plated tubes. Measurements were made at eight points around the circumference of the cross-section, on specimens cut from each end and the center.

It is believed that the two per cent eccentricity obtained could be further reduced by using a more flexible, slightly larger insulator-spacer on the anode.

4. ACKNOWLEDGMENTS

The authors acknowledge the helpful suggestions of Dr. Abner Brenner of NBS and Mr. Walter Kisner of Springfield Armory. We thank the project sponsor, Springfield Armory, for permission to publish the results of this investigation.

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EVALUATION OF FINE LINE ETCHING TECHNIQUES FOR PRINTED CIRCUIT APPLICATIONS

by JOHN R. SAYERS JR. and JACOB SMIT*

FINE LINE ETCHING techniques are by no means limited to the production of printed circuit wiring patterns. The creation of very fine lines is becoming increasingly more important in microminiaturization of circuit components, circuit interconnection and electroluminescent display work. In addition, the ability to accurately reproduce extremely fine lines can allow space and weight savings on some conventional and subminiaturized printed circuits. This article intends to give the reader some grasp of the capabilities and limitations of fine line etching so that more effective utilization of these techniques may be made where applicable.

*Research Division, Melpar, Inc., a Subsidiary of Westinghouse Air Brake Company, Falls Church, Virginia.

Published literature indicates that some fine line etching work has been previously performed. R. E. Overas[1] conducted a survey of the printed circuit industry to determine its ability to perform fine line etching. He supplied several leading printed circuit manufacturers with a transparency of various line widths and spacings with a minimum line width and spacing of 0.0078 inch and requested that circuits be made from it. A critical examination of the circuits produced and

1a. Original Layout

1b. Photo-reduced Layout

Fig. 1. Etch evaluation pattern.

methods employed in fabricating these circuits led Overas to draw the following conclusions:

1. Photographic techniques produce the best circuit.
2. Vacuum printing is essential for accuracy and definition.
3. Undercutting in etching is greater with wider conductor spacing.
4. Spray-etching techniques produce best results with splash- and immersion-etching following in that order.

In general, he drew the conclusion that printed circuit techniques are capable of consistently producing the 0.0078-inch conductor width and spacing, but that the majority of commercial fabricators do not exercise sufficient quality control to insure such high-quality fabrication.

E. Olsen[2] followed this work with a study of fine line etching using line widths and spacings as small as 0.0025 inch. This work emphasized determining the smallest line width that could be produced and the effect of printing process variables. A detailed process was evolved for fabricating line widths as small as 0.0025 inch with 0.0025-inch spacing and for determining the accuracy of the line reproduction.

The reported work contained a fairly detailed study of the effect of printing variables on the accuracy of the pattern. The variables associated with etching were not fully explored, and the number of etchants evaluated was rather limited. In addition, sufficient samples had not been used to indicate the reproducibility of the etching or the feasibility of performing fine line etching on a large scale (production basis).

To investigate the effects of variables in fine line etching and to substantiate some of the existing data, Melpar, Inc. initiated an experimentation program involving the fabrication and testing of a large number of samples.

ETCHING TECHNIQUE EVALUATION

To explore this area of etchants, a transparency of a test pattern was made to be utilized in the etching evaluation. The transparency, consisting of 37 lines (shown in Fig. 1), was made in a manner similar to that described by Olsen. The layout for this transparency was fabricated by laying down on Bristol board 37 parallel strips of black adhesive tape 0.25 inch in width and 0.25 inch apart. Selected ends of these strips were then joined to produce two continuous, parallel folded lines of sufficient length to accurately measure resistance. Only the outer conductor was of interest in the fine line etch study since it was impossible to measure changes in resistance of the inner conductor. This layout was then photographically reduced by factors of 25, 50, and 100. After reduction, the negatives should have contained equal line and space widths of 0.0100, 0.0050, and 0.0025 inch. The over-all length of the outside conductor on the patterns was 26.15, 13.07, and 6.54 inches, respectively.

The conductor widths on the three negatives were measured microscopically at three points along the conductor under study. The average conductor widths were 0.0106, 0.0049, and 0.0031 inch. The theoretical resistance of each pattern was then calculated for 1- and 2-ounce copper using the following formula:

$$R = \frac{\rho L}{WT} \qquad (1)$$

TABLE I

STILL VS SPRAY ETCHING

ETCHANT	COPPER THICKNESS IN INCHES	CONDUCTOR WIDTH IN INCHES	STILL ETCHING			SPRAY ETCHING		
			% LOST	AVERAGE RESISTANCE IN OHMS	AVG. DEV. IN RESISTANCE IN OHMS	% LOST	AVERAGE RESISTANCE IN OHMS	AVG. DEV. IN RESISTANCE IN OHMS
FERRIC CHLORIDE	0.0028	0.0100	40	0.91	0.04	0	0.91	0.03
"	"	0.0050	100	—	—	0	1.05	0.05
"	"	0.0025	100	—	—	100	—	—
"	0.0014	0.0100	40	1.56	0.02	0	1.44	0.03
"	"	0.0050	40	2.42	0.17	20	1.49	0.05
"	"	0.0025	80	2.65	— *	100 **	—	—
CHROMIC-SULFURIC	0.0028	0.0100	20	0.91	0.03	0	1.00	0.02
"	"	0.0050	100	—	—	40	1.12	0.01
"	"	0.0025	100	—	—	100	—	—
"	0.0014	0.0100	60	1.67	0.04	0	1.51	0.02
"	"	0.0050	40	2.61	0.26	0	1.73	0.07
"	"	0.0025	100	—	—	0	2.68	0.42
AMMONIUM PERSULFATE	0.0028	0.0100	X	X	X	0	0.85	0.07
"	"	0.0050	X	X	X	0	1.27	0.09
"	"	0.0025	X	X	X	100	—	—
"	0.0014	0.0100	X	X	X	0	1.48	0.05
"	"	0.0050	X	X	X	0	1.70	0.05
"	"	0.0025	X	X	X	100 **	—	—

X NOT DONE.

* ONLY ONE SPECIMEN SUCCESSFULLY ETCHED.

** PATTERN COULD NOT BE SUCCESSFULLY ETCHED DUE TO SHORTS.

where R = resistance, ρ = resistivity, and L, W, and T are size parameters of the conductor. T equals 0.0014 inch for the 1-ounce copper foil, and 0.0028 inch for the 2-ounce copper foil. A value of 1.72 μohm/cm was used for the resistivity of the copper. With 1-ounce copper, all the patterns have calculated resistances of 1.27 ohms. With 2-ounce copper, this value is 0.633 ohm.

Several factors place severe limitations on the use that can be made of the calculated resistance. This value presupposes a rectangular cross sectional area for the conductor, and any variation from this shape due to undercutting in the etching process would produce changes in the resistance. If all other factors were constant, changes in resistance would indicate such a variation (undercut). However, the copper thickness (T) varies from sample to sample and even over the length of the same sample. In addition, the specific resistivity of copper varies with its physical condition and may vary from sample to sample. Because of variations in these two factors, resistance may vary even though the conductor widths and degree of undercut are constant. Used in conjunction with microscopic examination, the calculated resistance can be useful in establishing target values and in giving a reference point for experimental results. This was the limited use made of calculated resistance in this program.

Test specimens for etching evaluation were produced by a photographic process on both 1- and 2-ounce copper-clad, epoxy-glass laminates. The photographic process consisted of the following operations:

1. Levigated alumina pumicing and rinsing
2. Cleansing in 10 per cent hydrochloric acid pickle and rinsing
3. Drying
4. Dipping in photo-resist and draining
5. Drying at 60C for 20 minutes
6. Ultra-violet exposure in vacuum printing fame
7. Trichloroethylene vapor developing (45–60 seconds)
8. Dyeing

Five samples of each pattern and each copper thickness were still-etched in ferric chloride and in a chromic-sulfuric acid mixture.* These etchants were used at room temperature and without agitation. These conditions were set up so that a direct comparison could be made with the spray-etching technique. It was necessary to perform the spray-etching at room temperature because the etch time was very short without heat and any further reduction in time would have resulted in very poor control. These samples were etched until all exposed copper was removed from between the conductors. Table I shows the results of the resistance measurements. Microscopic examination was used to detect the presence of unetched copper (shorts) between the conductors. The time required to etch the samples varied from between 28 and 60 minutes with 2-ounce copper to between 20 and 26 minutes with 1-ounce copper. Even with periodic rotation of the samples, the etched conductors were not uniform in width along their lengths.

Five samples of each pattern and copper thickness were also spray-etched in ferric chloride, in a chromic-sulfuric acid mixture, and in a 25 per cent ammonium persulfate etchant. All samples were spray-etched in a laboratory-size, commercial spray-etcher. The samples were identically positioned in the etcher in relation to the spray nozzles. After etching, the samples were microscopically examined and the resistance of each was measured. The results of these tests are also shown in Table I. The time required to etch all the exposed copper under these conditions varied from 2 to 6 minutes with a variation of one full minute for samples etched under identical conditions. A comparison of the results achieved by the two etching techniques (Table I) indicates that the least number of samples were lost because of discontinuities or shorts with the spray-etching technique. The number of samples lost due to these defects is expressed in Table I as per cent lost of the samples processed. In addition, all values of average resistance of the spray-etched samples are closer to the calculated value than those of the still-etched samples. The average differences for a test set were also lower with spray-etching than with still-etching.

This table appears to indicate that it is practically impossible to successfully produce the 0.0025-inch pattern under the conditions tested. A careful examination of the samples demonstrated that this was true for the samples on the 2-ounce copper (T = 0.0028 inch). Most of these patterns on 2-ounce copper displayed extreme reduction in line widths due to undercutting with many small discontinuities. The 0.0025-inch pattern was reproduced on the 1-ounce copper (T = 0.0014 inch) by spray-etching with good accuracy except for small unetched areas (shorted areas) joining the segments of the conductor. These shorted areas were randomly located over the samples tending to indicate that the negative or printing method was not at fault. Microscopic examination revealed that the copper in these shorted areas was as thick as the original copper foil and had not been etched. It appeared that some foreign material was providing these areas with etch resistance. Further experimentation revealed that the introduction of a scrub operation with an epoxy stripper would greatly alleviate this problem. The removal of this foreign material revealed pits and depressions leading to the conclusion that this material was incorporated at the time of lamination and probably was an epoxy resin. This scrubbing operation was employed with all the remaining samples.

REPRODUCIBILITY OF SPRAY-ETCHING

Based on the results presented above, spray-etching was selected for further study. Fifteen samples of each of the patterns and copper thicknesses were prepared and spray-etched with each of the three etchants. All samples for a particular etchant, conductor width, and copper thickness were etched for specific lengths of times. These times were those which produced the most uniform etch, and the resistance value closest to the calculated value. These samples were tested in the same manner as the first samples. The data from these tests are presented in Table II. To simplify comparison of the three etchants, the data were also treated to produce a percentage undercut and reproducibility factor.

To adequately express the percentage undercut (variation of the actual etched conductor area to the theoretical conductor area), it was necessary to derive an equation that would express variation in area as a variation in resistance. Since samples of the 0.005- and 0.010-inch patterns had been prepared and measured on both 1- and 2-ounce copper, the equation derived was based on the superimposition of the 0.005-inch line on the 0.010-inch line of the same copper thickness as illustrated in Figs. 2 and 3, and treating the whole as parallel resistors. The only assumption made was that the undercut for a particular etchant had the same profile (geometry)

*Commercial preparation.

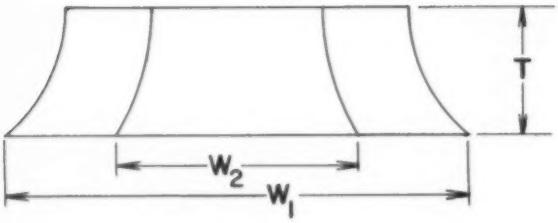

Fig. 2. Cross section of two conductors (one superimposed on the other) showing undercut.

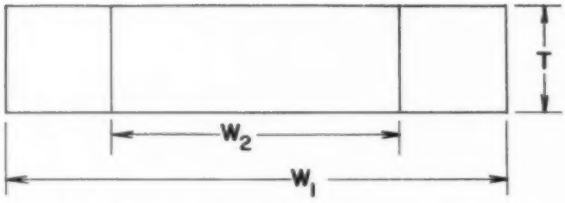

Fig. 3. Cross section of two conductors (one superimposed on the other) without undercut.

on both the 0.005-inch and the 0.010-inch patterns. Using the resistance equation (1), it is possible to show that

$$\frac{R_c}{R} = \frac{A}{A_c} \qquad (2)$$

where R_c equals the calculated resistance of the conductor, R equals the measured resistance of the conductor, A_c equals the calculated area of the conductor, and A equals the actual area of the conductor.

Since, by definition, undercut equals $A_c - A$, then

$$1 - \frac{A}{A_c} = \text{Fractional undercut.} \qquad (3)$$

Substituting from equation (2)

$$1 - \frac{R_c}{R} = \text{Fractional undercut, and} \qquad (4)$$

$$\left(1 - \frac{R_c}{R}\right) 100 = \text{per cent undercut} \qquad (5)$$

By the treatment as parallel resistors, it is possible to show that

$$R_{c1} = \frac{1 - \frac{w_2}{w_1}}{\frac{1}{R_1} - \frac{1}{R_2}} \qquad (6)$$

and

$$R_{c2} = \frac{\frac{w_1}{w_2} - 1}{\frac{1}{R_1} - \frac{1}{R_2}} \qquad (7)$$

where

R_{c1} = Calculated resistance of 0.010-inch line
R_{c2} = Calculated resistance of 0.005-inch line
R_1 = Measured resistance of 0.010-inch line
R_2 = Measured resistance of 0.005-inch line
w_1 = Measured width of 0.010-inch line
w_2 = Measured width of 0.005-inch line.

Substituting these expressions of R_{c1} or R_{c2} into equation (5) yields equations for the percentage undercut of either the 0.010- or 0.005-inch lines as a function of measurable variables entirely. The values for percentage undercut shown in Table II are the result of proper substitution of measured variables in this expression. Because of extreme difficulty in measuring the conductor widths on some patterns which were unevenly etched, the per cent undercut has been expressed as a range and not as an average value.

The per cent deviation in resistance at a confidence level of 66 per cent was used as a simple and rapid way of comparing etchants and etching conditions since it expresses standard deviation in resistance as a percentage of the average resistance for a test set.

There is no direct correlation between per cent undercut and the per cent deviation in resistance for a particular set. The per cent undercut is a specific value for loss of area and the per cent deviation in resistance is an evaluation factor for deviation of resistance only. The per cent undercut accounts for the conductor thickness after etching, although this variable may or may not be the significant factor affecting resistance upon which the per cent deviation in resistance is based.

Examination of Table II reveals that the 0.0025-inch pattern was not successfully reproduced by spray-etching for fixed periods of time. However, these patterns were reproduced on 1-ounce copper when the etching time was varied for the individual sample depending upon the thickness of copper. This method could certainly not be used on a production basis. Additional experimentation revealed that the 0.005-inch pattern could be overetched in a controlled manner to yield 0.003-inch lines with 0.007-inch spaces. A test set of five samples on 1-ounce copper etched in this manner had a resistance of 3.03 ohms with a 5 per cent deviation in resistance and percentage undercut of 19 to 29 per cent.

A careful study of Table II further reveals that:

1. The per cent deviation increases with decreasing copper thickness.
2. In general the per cent deviation increases with increasing line widths and spacing.
3. In most instances the percentage undercut is lowest for the ferric chloride etchant, slightly higher for the chromic-sulfuric mixture and highest for ammonium persulfate.

CONCLUSIONS

From the results of the fine line etching study up to the present time, the following conclusions are evident:

1. Under comparable conditions, the spray-etching technique is far superior to still-etching for etching fine line patterns.

2. Under the test conditions, ferric chloride etches more uniformly and provides the least undercut of the three etchants tested.

3. By use of the spray-etching technique, patterns with conductor widths and spacing as small as 0.005 inch can be

TABLE II
FINE LINE ETCH RESULTS

COPPER WEIGHT	ETCHANT	NUMBER OF SAMPLES	AVERAGE TRANSPARENCY LINE WIDTH	AVERAGE ETCHED LINE WIDTH	RESISTANCE IN OHMS	LINEAR RESISTANCE IN OHMS/INCH	AVERAGE % UNDERCUT	% DEV. IN RESISTANCE AT 66% CONFIDENCE LEVEL
2 OZ.	CHROMIC-SULFURIC	12	0.0106"	0.0113"	0.81	3.1×10^{-2}	12	4.7
"	FERRIC CHLORIDE	15	"	0.0101	0.89	3.4×10^{-2}	15	2.8
"	AMMONIUM PERSULFATE	15	"	0.0100	0.90	3.5×10^{-2}	20	6.9
"	CHROMIC-SULFURIC	15	0.0049	0.0038	1.61	12.3×10^{-2}	35	1.8
"	FERRIC CHLORIDE	15	"	0.0052	1.03	7.9×10^{-2}	30	7.3
"	AMMONIUM PERSULFATE	15	"	0.0052	1.17	8.9×10^{-2}	35-40***	7.5
"	CHROMIC-SULFURIC	15	0.0031	*	*	*	*	*
"	FERRIC CHLORIDE	15	"	*	*	*	*	*
"	AMMONIUM PERSULFATE	15	"	*	*	*	*	*
1 OZ	CHROMIC-SULFURIC	15	0.0106	0.0112	1.47	5.6×10^{-2}	6	1.7
"	FERRIC CHLORIDE	13	"	0.0114	1.45	5.6×10^{-2}	3	1.7
"	AMMONIUM PERSULFATE	13	"	0.0107	1.48	5.7×10^{-2}	5	2.6
"	CHROMIC-SULFURIC	15	0.0049	0.0054	1.65	12.6×10^{-2}	12	6.1
"	FERRIC CHLORIDE	15	"	0.0057	1.48	11.3×10^{-2}	5	2.6
"	AMMONIUM PERSULFATE	15	"	0.0049	1.70	13.0×10^{-2}	9-14 ***	4.4
"	CHROMIC-SULFURIC	15	0.0031	* *	* *	* *	* *	* *
"	FERRIC CHLORIDE	15	"	* *	* *	* *	* *	* *
"	AMMONIUM PERSULFATE	15	"	* *	* *	* *	* *	* *

* PATTERN COULD NOT BE SUCCESSFULLY ETCHED.

** PATTERN COULD NOT BE SUCCESSFULLY ETCHED AT CONSTANT ETCHING TIME BUT COULD BE ETCHED ON INDIVIDUAL BASIS.

*** EXPRESSED AS RANGE BECAUSE OF DIFFICULTY IN ACTUALLY MEASURING CONDUCTOR WIDTH.

etched on both 1- and 2-ounce copper with small deviations in resistance and at a constant time even with the usual variations in foil thickness. With close control of the etchant, it appears possible to produce such patterns on a production basis. The 0.0025-inch pattern can only be successfully etched on an individual basis (time varying) because of the significant effect of varying foil thickness on these extremely thin lines. It appears that this conductor width with a wider spacing can be produced on a production basis by controlled overetching of larger conductor widths.

FUTURE NEEDS

Before components can be made on a production basis with very fine line widths, it is important that the following variables be studied to determine their effect on the etching:

1. Spacing between the conductors on undercut and reproducibility.

2. Droplet size of the atomized spray, force of the spray, and angle of spray contact with the conductors. Preliminary studies have indicated that placement of the samples in relation to the spraying nozzles has a significant effect on undercutting. This whole area should be fully explored so that the design of spray-etching machines can take full advantage of the knowledge developed.

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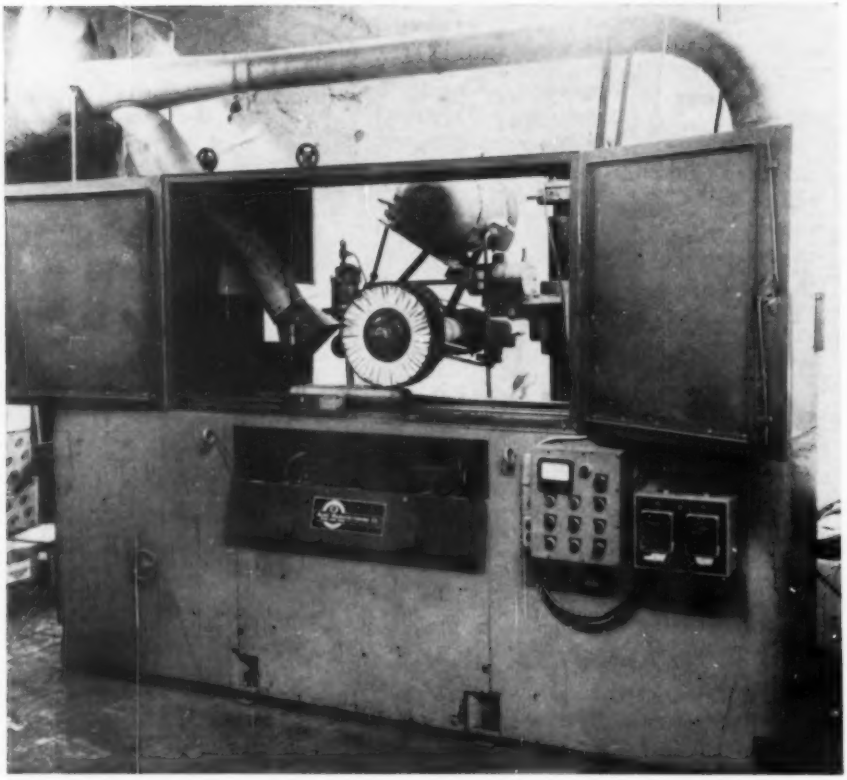
[2]Olsen, Edith, "Fine Line Etched Wiring," Proceedings of the Symposium on Microminiaturization of Electronic Assemblies, Hayden Book Company, New York, New York (1958).

John R. Sayers Jr. is supervisor of the Process Development Branch of the Research Division of Melpar, Inc. and has been with Melpar since 1955. Mr. Sayers has been intimately involved in the research, development and installation of processes in the areas of metal finishing and printed circuitry. Research and development programs in which he has participated include microminiaturization of printed circuits, aluminum forming by electroplating from nonaqueous electrolytes and vapor plating, stress in electroplated metals, chemical milling of aluminum and magnesium, molded printed circuits, flame spraying techniques, high intensity arc studies and unique surface finishes for aluminum, magnesium, and stainless steel. Recent emphasis has been placed on aluminum and germanium vapor plating. Mr. Sayers attended Hampden-Sydney College and is continuing his studies at American University. He is a member of the American Electroplater's Society and the Society of Plastics Engineers.

Jacob Smit, physicist, joined Melpar in September 1959. He has engaged in work concerning the evaluation of fine-line etching; investigated the feasibility of producing circuit components by means of photoetching techniques; and investigated the possibility of producing an integrated circuit composed of elementary circuit components produced by etching and deposition. As an Engineering Aid with ALCO Products, Incorporated, he made thermodynamic calculations on cross-flow and counter-flow heat exchanges. He attended the Cincinnati College of Music, Pennsylvania State University and received a Bachelor's degree in physics from Siena College, Loudonville, N. Y., in 1958.



The experimental buffing machine used in the studies of Project No. 18.

AES RESEARCH PROJECT NO. 18

MECHANICAL FINISHING OF METAL SURFACES

I. ZINC BASE DIE CASTINGS

A. Bar Compounds

by **WILLIAM C. GEISSMAN*, R. SCOTT MODJESKA** and KENNETH GATCHEL***

ABSTRACT

The first phase of AES Research Project No. 18 covers studies made in buffing and polishing zinc die castings employing bar compounds. A short history of the project, a description of equipment and procedures, a glossary of terms used in the buffing and polishing field augment the experimental data. Factors influencing results obtained in buffing and their relative importance are discussed.

INTRODUCTION

PROBABLY THE MOST EXPENSIVE single operation found in the metal finishing industry, despite the outstanding advances made in automating these operations, is that of polishing and buffing the piece prior to the subsequent finishing operation. In early 1955 a group of men headed by Clyde Kelly, and including C. J. Kennedy, R. S. Modjeska, J. H. Monaweck and L. E. Weeg, all of whom were vitally interested in the affairs of the AES, met to discuss the feasibility and desirability of organizing a project to investi-

*National Lock Company, Rockford, Illinois.
**Scientific Control Laboratories, Inc., Chicago, Illinois.

gate these apparently ignored operations. Through their efforts Project 18, "The Mechanical Preparation of Metal Surfaces" was activated under the jurisdiction of the Research Committee in late 1955. A literature search (Research Report No. 39) was then undertaken, and the survey showed that not much of a quantitative nature had ever been published on the subject of polishing and buffing. This further convinced the Committee of the need for Project 18.

It was then decided to focus the scope of the project on a relatively small area. A questionnaire was sent to a total of 150 job and captive shops in the Chicago area. From the returns, it was evident that there was a considerable interest in the buffing of zinc die castings, and as a result the work was centered around this subject of paramount concern.

During this period, due to the aforementioned lack of any real information, most of the major suppliers of buffing and polishing equipment were contacted in an effort to obtain any quantitative data that might have been developed in their laboratories. The answers given to these queries further demonstrated the need for Project 18, since none of these companies had engaged in any fundamental research work on this subject. Most of the suppliers were quite willing to make available all of the information at their disposal, but all of it pertained to the solution of a specific problem and was not of universal use. The aim of this work is not to provide a solution to a particular problem but rather to develop certain fundamental data so that specific problems might be more intelligently attacked. With these replies came offers of help in the form of equipment and/or supplies to be used in the furtherance of the project. In fact, the experimental buffing machine, the major piece of equipment used in this work, was obtained through an offer made to the Committee.

Almost simultaneously serious attempts were made to obtain test panels that might be used as a standard test piece for the buffing of zinc die castings. It was decided to use a piece that had a relatively large flat area that was being cast, buffed and plated at the National Lock Company for a major producer of large kitchen appliances. Since this casting was uniform and of good quality and was being produced in considerable quantity, it was felt to be more suitable than one produced in small quantity, especially for this study.

It was also decided that the location for the Project would be at National Lock Company, Rockford, Ill.

Since many of the terms used in this report are unique to the art, a glossary of terms is included and follows the section entitled "Summary."

DISCUSSION

The buffing of a piece of metal may seem to the uninitiated to be a relatively simple operation, involving the mere act of bringing the part up to the buff after some compound has been applied to the face of the wheel. But this is not the case. Enumerating all of the variables involved makes the complexity of the problem all too apparent.

VARIABLES IN BUFFING

I. Speed of buff measured in Surface Feet Per Minute

II. Linear speed of piece under the buff

III. Speed of buff oscillation from side to side

IV. Buff wheel
   - A. Kind of cloth
     1. Thread count
     2. Weight per square yard
     3. Twist of the thread
     4. Cut of the cloth
     5. Length of the fibre
   - B. Design and density
   - C. Size

V. Pressure on the piece

VI. Compound
   - A. Amount and frequency of application
   - B. Kind

It is now considered that three major actions take place during the buffing operation:

(1) Stock removal by the cutting action of the abrasive. This cutting action is similar to that found in the grinding or polishing operation. The hardness of the abrasive and the speed it is traveling over the work surface literally cuts away stock. This effect is most evident on the harder metals, such as cold rolled carbon steel or stainless steel.

(2) The burnishing action which removes little if any stock, but flows the metal by pressure, speed and heat of the buff and hardness of the abrasive into a smooth finish. This effect is considered more important in the case of the softer metals such as copper, zinc, brass and silver.

(3) The chemical action which is influenced by the high temperatures at the contact point between the buff and the metal. At these high temperatures, the stearic acid or fatty acids present in the buffing compound binder become reactive with the metal. This chemical action aids materially in effecting a fast buffing action and in coloring out to a clear bright finish.

Consideration of the variables in the buffing operation and theorizing as to what actually happens in the buffing operation brings many questions to mind, some of which are: (1) What is the temperature on the face of the buff? (2) What is the temperature of the part being buffed? (3) What really influences the wear of the buff? (4) What influence does the hardness of the piece have on the buffing operation? (5) What amount of the compound applied stays on the buff? (6) What is the correct amount of compound, and how should it be applied? (7) What happens to the buffing compound, and what are the residues left on the buff? (8) How much metal is removed from the piece?

Certainly, this list is by no means complete and there are many more questions that can be asked but it was thought that the above list furnished more than enough problems for a start.

EXPERIMENTAL APPARATUS

The experimental buffing machine was designed to eliminate most of the human element from the testing operations. This reduced the variables that would otherwise have to be taken into consideration.

The speed of the buff was controlled by a centrifugal pulley and screw which forced the belt into different positions in the pulley. The range of speeds obtainable through this arrangement was from 835 rpm to over 2000 rpm. Thus for a 16-inch buff the speeds would range from 3498 to over 8000 sfpm. The majority of the testing on die castings took place in the

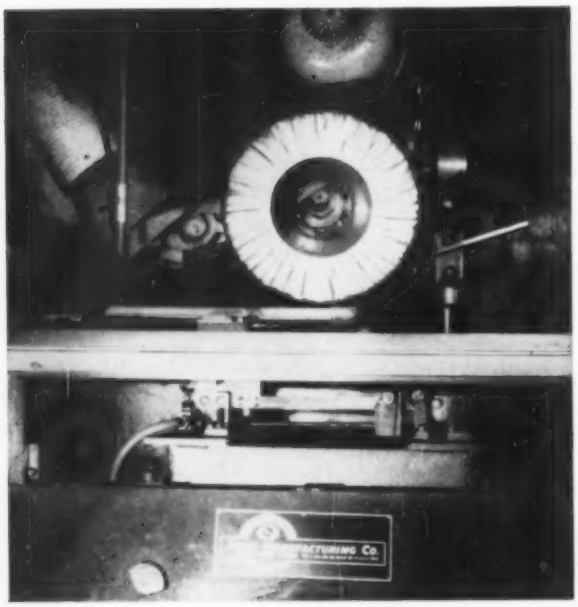


Fig. 1. Photograph showing floating platform, scale, and buff.

3500–6000 sfpm category. The reason for this particular selection is described elsewhere in this report.

The amount of oscillation of the buff was controlled by means of a variable cam located at the rear of the drive shaft of the buff. This movement could be varied from an inch to zero. The speed of the buff oscillation was not controlled but was in direct proportion to the buff speed. This cam was locked into position by means of an Allen screw.

The buffing fixture was mounted on steel plates. These steel plates were on a continuous chain. The rate of travel of this chain was controlled by another arrangement of a centrifugal pulley and a screw. The travel or table speed ranged from 5 feet per minute to over 30 feet per minute. The travel direction was reversible, thus eliminating the necessity of having to circumnavigate the entire chain periphery. The cutting operation was performed in the clockwise direction and the color operation in the counter-clockwise direction. At all times the buff was rotating in the clockwise direction.

The floating platform and scale arrangement is shown in Fig. 1. The platform was 25.5 inches long. The buffing fixture was 20 inches long. The platform was integrated with the scale by means of a series of cams and shafts. Pin bearings were used at all rotating points. The counter balance was adjustable on a 15-inch slide. When the pressure exceeded the counter weight, the torque created by this overload forced the overload switch to be depressed. This in turn activated an air solenoid forcing the buffing head up. When the excessive pressure was relieved, then the switch and solenoid were released, and the buffing head was dropped onto the test piece. This arrangement allowed a sensitivity of plus one to minus two pounds of that set by the operator.

The delay between the appearance of excessive pressure and reaction by the release system was 2.2 seconds. This allowed the test piece to travel 6.6 inches with a table speed of 15 feet per second. In general the pressure was not exceeded for more than a fraction of a second. A majority of

Fig. 2. Simple lever.

Fig. 3. Simple lever with weights.

Fig. 4. Simple lever out of balance.

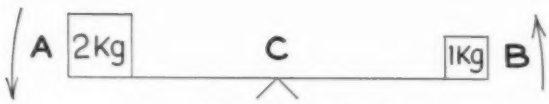


Fig. 5. Simple lever out of balance.

the time this overpressure was entirely due to the buffing head meeting the shock caused by the fixture making its entrance into the buff. The area of appraisal on the test piece was selected so that it was outside of this shock area. This was the center ten inches of the test piece. If any overload disturbance was encountered in the appraisal area it was marked and investigated for incongruences. Usually these appeared as inconsistencies in line removal and the test was repeated with another sample. The cause of these disturbances was roughness on the casting surface.

The "heart" of the experimental machine is the scale and overload switch system. The physical principle of this device is based on the simple lever.

Figure 2 shows a platform which is in perfect balance on the fulcrum located at C. The fulcrum is the point along the distance AB where the platform is in perfect balance. If A or B are moved to a position other than the horizontal then they will remain in position.* If a one kilogram weight is placed at both A and B the lever will act as above (Fig. 3). However, when another kilogram weight is placed at B (Fig. 4), then the lever is out of balance, and by seeking equilibrium the lever rotates in a clockwise direction. In other words, A is forced up, and B is forced down. The opposite case is shown in Fig. 5. A popular form of the lever is the teeter-totter used by children. The two children have to shift their weight until the lever law** is satisfied and consequently balance is achieved.

The principal parts of the scale are shown in Fig. 6. When a weight is in place on the platform and counterweighed on

*The positions where this is not true are where the inclination of the level is at or higher than the angle of friction between the fulcrum and the platform.

**The lever law: Balance is achieved when the weight at A multiplied by the distance AC is equal to the weight at B multiplied by the distance CB. Example:

AC = 4 meters CB = 2 meters
Wt at A = 1 kg Wt at B = 2 kg
4 × 1 = 2 × 2

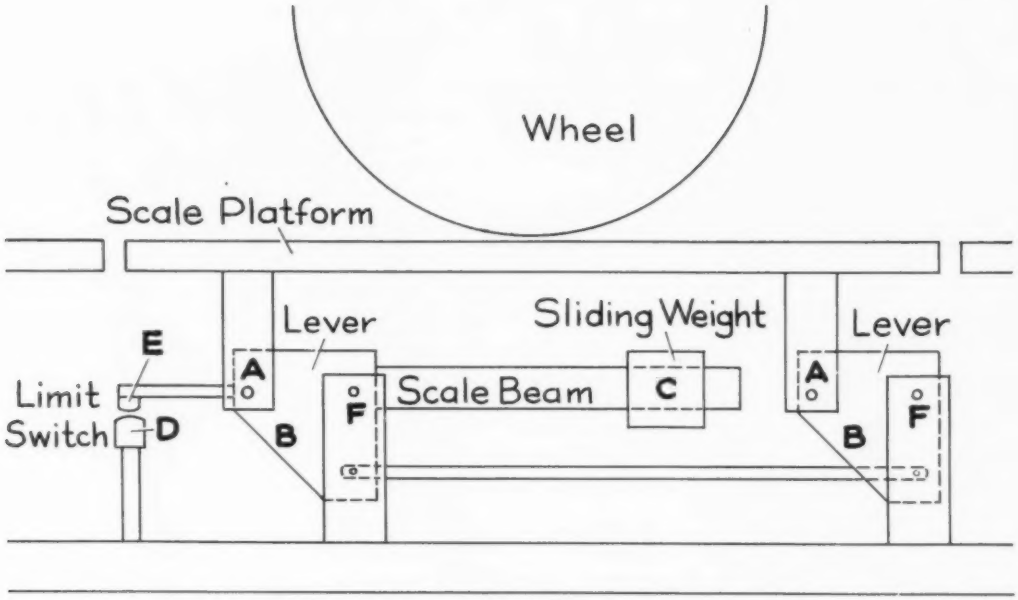


Fig. 6. Schematic drawing of the platform and scale arrangement.

the scale beam by the sliding weight, then no leverage* is obtained. If the weight or pressure force applied to the platform exceeds that counterweighed, then all points at A and B are forced down, and that at C up. This causes E to strike the trip switch at D, activates the air solenoid, and lifts the buffing wheel. The lever in this scale is located at AC, and the fulcrum is at F. The part EA is an extension of this lever.

EXPERIMENTAL PROCEDURE

The operation includes the following: (1) scribing the test piece, (2) setting the variables on the machine, (3) applying the compound to the wheel, (4) buffing the test piece, and (5) buffability determination.

Scribing the test piece. The test piece is a standard zinc die casting produced by the company where the Project is located. This piece is a handle having a flat surface measuring 16 inches by 2.5 inches. The actual testing area is approximately one and one-eighth inches wide. See Fig. 7.

*Leverage is obtained when the force at A or B (Fig. 4) exceeds that at the opposite end. Thus:

AC = 4 meters
CB = 2 meters
Wt at B = 2 kg

Then 2 × 2 = 4 × 1 where a weight slightly exceeding one kilogram is able to lift a two kilogram force above the horizontal. The leverage is then specified as 2 to 1.

The instrument for scribing the triplicate set of lines is shown in Fig. 8. The test piece is placed on the fixture C, the desired weight admitted to the pan B over the Rockwell "C" diamond mounting A; the test piece scribed perpendicularly to the long edge in only one direction. The weights are varied from 100 to 850 grams in increments of 50 grams. The grouping of the triplicate lines was determined in a random fashion. This eliminates any set pattern and the variational influences existing in the castings. The fulcrum of the instrument is located at E when the pan is empty. The diamond mounting and the pan are counter-balanced by weights at D. For purposes of this project, these lines are designated as gram scratch lines, abbreviated GSL.

Setting the variables on the machine. The correct revolutions were set and checked with a strobotac. The diameter of the buff was measured and the surface feet per minute calculated for the predetermined speeds. The buff diameter was checked frequently during the testing operations, and the rpm corrected. A test piece was mounted in the fixture provided and positioned in the center of the floating platform. The correct weight was placed on the fixture and counterweighed on the scale located below the platform. The revolving buff was lowered onto the test piece until the

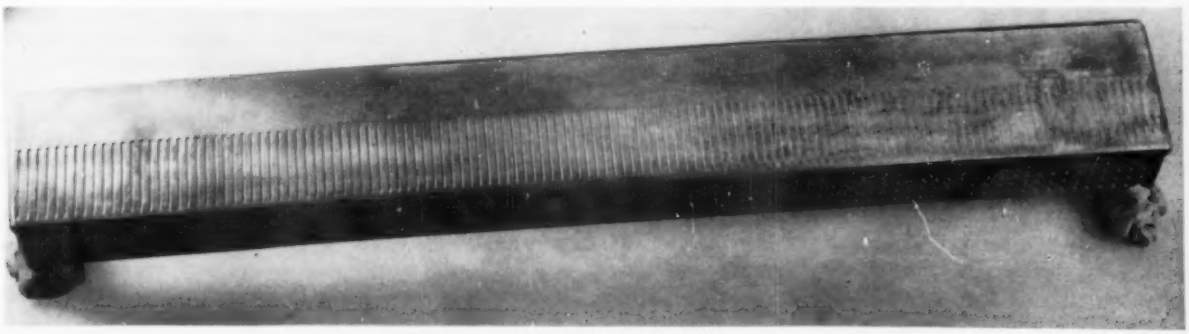


Fig. 7. Test piece used for the buffing tests.

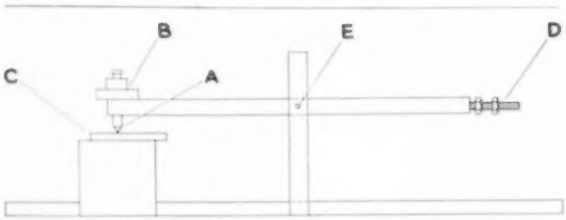


Fig. 8. Drawing of instrument used for drawing the gram scribe lines.

pressure exerted on the piece was the same as that placed on the fixture.

The travel was set and checked with a stopwatch over a measured course. The buff oscillation was adjusted by means of a cam located on the drive shaft and locked in position.

Applying the compound. The buffing compound conforms to the following specification.

Component	Weight
Double pressed animal stearic acid...	60.00
Paraffin base petrolatum 118° m.p....	15.00
Micro-crystalline wax 165° amp.....	10.00
Prime beef tallow 41–42C titer.....	15.00
(Binder)	100.00
Once ground Rose tripoli powder....	192.50
	292.50

PROCEDURE: The binder is formulated and melted to 170F, and the tripoli powder (not pre-heated) is slowly added to the binder with mixing until a homogeneous mix is obtained. This usually requires ten minutes, depending on the mixing speed, and the mixing is continued during the pouring operation. The compound is then poured into pans and cooled in 50 to 60F water.

This bar compound was weighed, then applied tangentially to the wheel by hand. The bar was reweighed, applied to the wheel, and reweighed until the specified amount of compound was worn from the bar. A torsion balance of five kilogram capacity and sensitivity of 0.1 g was used for all weighings.

Buffing the test piece. Before any tests were run, the buff was broken in by using it in production for two or more hours with the same compound as was used in the tests. The test piece was mounted in the fixture. Two cut passes were made in the opposite direction of the revolving buff and one color pass in the same direction. The second cut pass was obtained by tripping the raising mechanism of the wheel and positioning the fixture for the second cut pass.

Determination of buffing results. The test pieces were cleaned in a five phase degreaser. The pieces were checked by two observers to obviate any personal misjudgments. A 14-power magnifier was used to determine which of the lines were removed. The degree of buffing was specified as the deepest gram scratch lines obliterated.

VALIDITY OF THE METHOD OF LINE SCRIBING

Although the method of scribing the lines on the test pieces was not new, having been used for some time on buffing tests for stainless steel, it was desirable to prove that this method was valid for zinc die castings. If the depth of the lines did not increase fairly uniformly for each increment of 50 grams, this procedure obviously could not be used. After some preliminary work it became evident that the Brush Surface Analyzer was not dependable when used directly on the zinc die casting. It was then decided to electroform a negative by heavy nickel plating on a casting that had been scribed with lines as noted in the Experimental Procedure. The zinc was then dissolved in hydrochloric acid, thus leaving a negative in nickel. The depth of the lines could then be

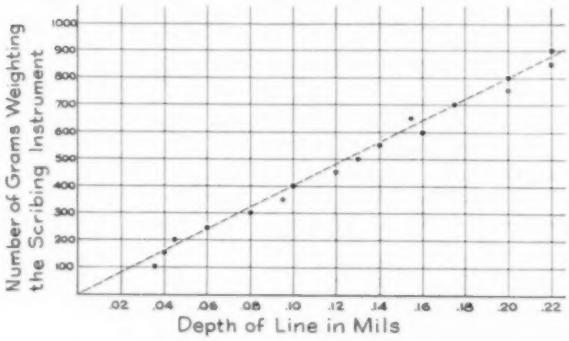


Fig. 9. Relationship between weights used for scribing lines and the depth of the lines.

determinod easily by measuring the height of the projections on the nickel negative. The graph (Fig. 9) shows that the results were consistent up to the lines scribed under the 800-gram weight. It seems that this method is valid for the readings made in these experiments and can be used with a good degree of assurance.

DESIGN OF EXPERIMENTS

In the initial programming seven factors affecting buffing were considered. After completing the first series of tests, it was determined to vary through five levels the factors of wheel speed and pressure and through three levels the amount of buffing compound. In spite of the reduction in the number of variables to be studied, were each to be checked with respect to the other, varying only one level per test, the number of possible combinations would preclude the completion of the project within any practical time limit.

A program which would reduce the number of tests to be run without invalidating the results obtained was a necessity. To this end a statistical tool known as a "Latin Square" was employed. If each variable is studied at five levels with no duplication of any level for a given variable occurring within a test series then a small fraction of the possible combinations would give a true statistical evaluation. The "Latin Square" system may also be explained as a method wherein duplication of any condition within a given test results in constants. Thus with the constants cancelled the number of tests required to give a true result are reduced to the minimum. The term "Latin Square" merely refers to the identification of the particular variables within the test outline for tabulation purposes, e.g. IA, IIB, IIIC, etc.

Thus in a given series of tests the 25 values of the gram scratch lines removed will be recorded and analyzed by separating the levels of each of the variables and determining the averages. In this way the optimum condition or peak value for any variable may be found regardless of how widely the other conditions might range.

(To Be Continued)

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DR. HAROLD J. READ WINS 1960-1961 CHARLES HENRY PROCTOR MEMORIAL LEADERSHIP AWARD

Presented for the second time in the history of American Electroplaters' Society, Inc. (AES), the Charles Henry Proctor Memorial Leadership Award, inaugurated in 1959 during the AES's GOLDEN ANNIVERSARY, was won and received by Dr. Harold J. Read at the AES's 48th Annual Convention, Boston, Massachusetts, June 18–23, 1961. He earned that honor for outstanding leadership and AES service performed as creator of the acclaimed "Hydrogen Embrittlement in Metal Finishing" Symposium held by the Society at its 47th Annual Convention, Los Angeles, California, July 24–28, 1960.

Highest non-scientific, non-technical Award of the Society, the Proctor Award is sponsored for the AES by Mr. and Mrs. William Osborne Preston, son-in-law and daughter respectively of the late Charles Henry Proctor, founder of the Society. Winner is annually selected from among nominees of respective Branches and Committees of the Society. The 1960–1961 Selection Committee, the Award's second, was composed of the donors, plus National President W. Andrew Wesley; National Executive Secretary John P. Nichols; Research Committee Chairman D. G. Foulke, Order of Past Presidents Chairman Samuel S. Johnston; Kansas City Branch President Warren B. Eliot and Syracuse Branch President William M. Robinson.

Dr. Read was announced as 1961 winner at the Farewell Banquet of the AES's Boston Convention Thursday evening, June 22 by Selection Committee Chairman Wesley, and was there presented, midst applause, with a $150 cash award plus a handsome laminated scroll. From among a number of contenders nominated by AES Branches and Committees, he was the overwhelming choice of the Selection Committee on the strength and significance of his leadership deeds in creating the Society's "Hydrogen Embrittlement in Metal Finishing" Symposium held at the AES's Los Angeles Convention, and in serving as AES Editor of the book being published by a leading technical book publishing company, by contractual arrangement with AES, embodying not only those Convention papers but also others marshaled for AES on that subject by Dr. Read.

Dr. Harold J. Read

A member of the AES's Pittsburgh Branch, Dr. Read is Professor of Physical Metallurgy at the Pennsylvania State University, University Park, Pennsylvania

As second winner of that coveted annual Award, Dr. Read follows in the footsteps of its first winner, namely Past President Walter L. Pinner. Mr. Pinner achieved the Award in 1960 for his service as Chairman of the AES's world-acclaimed "Fifth International Conference on Electrodeposition and Metal Finishing" held in Detroit in June 1959 concurrently with the Society's GOLDEN JUBILEE Convention and Fifth Industrial Finishing Exposition.

WINNERS OF AES HIGHEST SCIENTIFIC HONOR

Above, the four annual winner's to-date of the AES Scientific Achievement Award, namely (Top to Bottom) Dr. William Blum (1958); Dr. A. Kenneth Graham (1959); Dr. Charles L. Faust (1960); Dr. Abner Brenner (1961).

AES THANKS . . .

The Society expresses its warm thanks to the Metal Finishing Suppliers' Association (MFSA) for the fellowship and fun provided to AES members during "off-duty" hours at the AES's recent 48th Annual Convention (Boston, Massachusetts, June 18-23, 1961) through the Convention events sponsored by it, including 1. The MFSA Ball (June 19); 2. The Golf Tournament (June 21); 3. The pre-Banquet Cocktail Party (June 22).

AES also thanks each and every individual industrial company that sponsored plant tours—or "get-togethers", luncheons or other relaxational "off-duty" hour events at the Boston Convention.

It also extends its appreciation to the Hanson-Van Winkle-Munning Company for providing its delightful daily Convention tabloid so greatly enjoyed daily by AES members, their families and their Convention guests for the 27th consecutive year.

FUTURE MEETINGS

Education is the business of AES. For National, Regional and Branch educational and other AES meetings ahead, see PLATING's section titled FUTURE MEETINGS herein.

AES NEWS

THIRD WILLIAM BLUM LECTURE DELIVERED BY DR. CHARLES L. FAUST

Dr. Charles L. Faust, third AES Scientific Achievement Award winner, delivered the third annual "William Blum Lecture," at the Society's Boston Convention, June 19, a feature of that AES 48th Annual Convention.

He presented "The Challenge Before Us" and was honored immediately after the lecture by the awarding to him of a handsome scroll, plus a $500 honorarium, by National President W. Andrew Wesley in behalf of a grateful and admiring AES. Dr. A. Kenneth Graham, 1959 AES Scientific Achievement Award winner, served as Session Chairman.

1962 AES NATIONAL CONVENTION LEADERSHIP
(Top to bottom) General Chairman of AES's 1962 Milwaukee Convention, Herman A. Tessmann; Assistant Chairman, Ralph D. Wysong, and Assistant Chairman, Leonard P. Weeg.

DR. ABNER BRENNER AWARDED AES's HIGHEST SCIENTIFIC HONOR

American Electroplaters' Society, Inc. (AES), climaxing its fifty-second year with a memorable 48th Annual Convention held at the Statler-Hilton Hotel, Boston, Massachusetts, June 18–23, 1961, named the fourth winner of its AES Scientific Achievement Award, the Society's highest scientific honor. It selected for that coveted annual award, the distinguished scientist, Dr. Abner Brenner, Chief of the Electrodeposition Section of the National Bureau of Standards, Washington, D. C.

The selection of Dr. Brenner as the fourth annual winner of that AES honor was announced to the large audience attending the Grand Opening Session of the 48th Annual Convention held in the Grand Ballroom of Boston's Statler-Hilton Hotel, Monday morning, June 19. The report was made by William M. Tucker of the Eastman Kodak Company, Chairman of the AES's Selection Committee, itself composed of well-known scientists, namely Dr. William Blum, Myron B. Diggin, Dr. Henry B. Linford, Dr. Louis Weisberg and Dr. Harold J. Wiesner, besides Mr. Tucker.

Dr. William Blum was that annual AES Scientific Achievement Award's first winner. As such, he delivered the first "William Blum Lecture" before an overflow audience at the Opening Session of the Fifth International Conference on Electrodeposition and Metal Finishing in the Statler-Hilton Ballroom at the Society's Golden Jubilee Convention in Detroit, June 15, 1959.

Dr. Brenner, like Dr. Blum, Dr. A. Kenneth Graham, second winner, and Dr. Charles L. Faust, third winner, earned selection by his "decade-plus" accomplishments in advancing the theory and practice of electroplating, metal finishing and allied arts; in raising the quality of its processes and products, and in enhancing the dignity and status of the profession.

Dr. Brenner will deliver the fourth "William Blum Lecture" at the AES's Annual Convention to be held in Milwaukee in 1962. He will receive a scroll, a $500 honorarium and other attendant honors. By coincidence, he is also this year's winner of the Hothersall Memorial Medal of the Institute of Metal Finishing of England.

DR. ABNER BRENNER

Abner Brenner was born August 5, 1908 and received his BA degree in 1929 from the University of Missouri, MS degree from the University of Wisconsin in 1930, and PhD from the University of Maryland in 1939. He has been on the staff of the National Bureau of Standards since 1930.

Some of the subjects on which he has done research are alloy deposition, physical properties of electrodeposits, electroless plating, electrodeposition of metals from nonaqueous media, cathode diffusion layers, thickness gages for electrodeposits, and deposition of metals from the vapor phase.

He has been Chief of the Electrodeposition Section for about the past ten years. During this time the activities of the Section have broadened to include other fields as well as conventional electroplating. The work of the Section, on the one hand, deals broadly with metal coatings obtained by electrodeposition from aqueous, organic or fused salt media, or by deposition from the vapor phase. On the other hand, the Section does fundamental work on the mechanism of electrolytic processes which do not necessarily involve metal deposition.

He has served on the Editorial Board of PLATING MAGAZINE, and on several committees of the AES. He has been active in the Electrochemical Society, being the divisional editor for electrodeposition from 1950 to 1958 and the past chairman of the Electrodeposition Division. He is also a member of the Institute of Metal Finishing (England); the American Chemical Society, and the Washington Academy of Sciences.

He has four sons, ages 15 to 24. The eldest has a degree in electrical engineering and the next eldest a degree in physics. The two younger boys are also interested in science. His wife, Sonia, is a supervisor of elementary education in the County school system.

Dr. D. E. Koontz

Dr. David O. Feder

Dr. Carl O. Thomas

Paul Glab

R. Scott Modjeska

Simon P. Gary

William H. Safranek

Robert W. Hardy

Hugh R. Miller

Dr. Charles L. Faust

Charles C. Corn

Harry Sosson

Ignatius Tsu

Robert A. Ehrhardt

John G. Poor

C. Lee Alderuccio

Dr. Hyman Chessin

EIGHTEEN AES AUTHORS HONORED AT SOCIETY'S 48th ANNUAL CONVENTION

"The fiscal year of 1960-1961," reported the 1960-1961 AES Paper Awards Committee, "represented a high level of activity in the publishing of technical material by the American Electroplaters' Society, Inc. (AES). The Committee on Paper Awards considered 48 papers published in PLATING MAGAZINE, 30 papers published in TECHNICAL PROCEEDINGS (1960 Edition) and 2 carry over papers. In our opinion, the quality of papers published is on the upgrade.

"In accordance with recorded AES policy, the Committee on Paper Awards has duly considered and rated all eligible papers for the three AES major paper awards and the eight AES special paper awards. The following were judged the winners for the 1960-1961 fiscal year:

♦

THE CARL E. HEUSSNER AES GOLD MEDAL AWARD
Co-sponsored by the United Platers' Foundation (Glenn H. Friedt, Trustee) and AES for the best paper published in AES publications during the fiscal year. Awarded to "On the Mechanism of Transport of Hydrogen Across a Solution-Metal Interface" by R. J. Barton, Advanced Metallurgical Studies Branch, Wright Air Development Division, Wright-Patterson Air Force Base, Ohio. (TECHNICAL PROCEEDINGS, 1960 Edition)

♦

THE AES SILVER MEDAL AWARD
Sponsored by AES for the second best paper published during the fiscal year. Awarded to "Cleaning in the Electronics Industry" by D. E. Koontz, D. O. Feder and C. O. Thomas, Bell Telephone Laboratories, Inc., Murray Hill, New Jersey. (TECHNICAL PROCEEDINGS, 1960 Edition)

♦

THE AES BRONZE MEDAL AWARD
Sponsored by AES for the third best paper published during the fiscal year. Awarded to "Solution Transfer in Barrel Plating" by Paul Glab, Northwestern Plating Works, Chicago, Illinois and R. Scott Modjeska and S. P. Gary, Scientific Control Laboratories, Inc., Chicago, Illinois. (TECHNICAL PROCEEDINGS, 1960 Edition)

♦

THE GEORGE B. HOGABOOM MEMORIAL NICKEL PLATING AWARD
Co-sponsored by AES and its Hartford Branch. Awarded to "The Preparation and Properties of Iron-Nickel Films" by Ignatius Tsu, International Business Machines Corporation, San Jose, California. (PLATING MAGAZINE, June 1960)

♦

THE CHROMIUM PLATING AWARD
Sponsored by the Nutmeg Chrome Corporation. Awarded to "Use of Selenic Acid for Plating Microcracked, Protective and Decorative Chromium Plate" by W. H. Safranek and R. W. Hardy, Battelle Memorial Institute, Columbus, Ohio. (PLATING MAGAZINE, September 1960)

Dr. Richard J. Barton

♦

THE ROBERT S. LEATHER MECHANICAL FINISHING AWARD
Sponsored by the Lea Manufacturing Company. Awarded to "Adherence of Thick Chromium Deposits as Affected by Surface Preparation" by J. G. Poor, Spar-Tan Engineering Co., Los Angeles, California and H. Chessin and C. L. Alderuccio, Van der Horst Corporation of America, Olean, New York. (PLATING MAGAZINE, July 1960)

♦

THE PRECIOUS METAL PLATING AWARD
Sponsored by the International Nickel Company, Inc. Awarded to "Acid Gold Plating" by R. A. Ehrhardt, Bell Telephone Laboratories, Inc., Murray Hill, New Jersey. (TECHNICAL PROCEEDINGS, 1960 Edition)

♦

THE ALUMINUM FINISHING AWARD OF AES
Sponsored by the Kaiser Aluminum & Chemical Company. Awarded to "Superior Sealing of Anodized Aluminum and its Alloys" by Charles C. Cohn, Colonial Alloys Company, Philadelphia, Pa. and Harry Sosson, formerly Research and Development Division, Chemical Laboratory, Department of the Navy, Philadelphia, Pa. (PLATING MAGAZINE, August 1960)

♦

THE ZINC AWARD OF AES
Sponsored by the American Zinc Institute. Awarded to "Data on the Corrosion Resistance of Electroplated Zinc Die Castings" by W. H. Safranek, H. R. Miller, R. W. Hardy and C. L. Faust, Battelle Memorial Institute, Columbus, Ohio. (PLATING MAGAZINE, April 1960)

♦

"No John J. Hanney Memorial Copper Plating Award nor Organic Finishing Award of AES could be made," the Committee reported, "because there were only two papers published in the respective categories, whereas a minimum of three papers per category are required."

To its successor (1961-1962 Paper Awards Committee), the 1960-1961 Committee consequently referred the four papers for 1961-1962 consideration for special award.

The 1960-1961 Committee on Paper Awards was headed by Frank Tirendi, Patent Button Company, and included William M. Tucker, Eastman Kodak Company and Dr. Martin Frant, AMP, Inc.

Rafael Diaz

TWO AES MEMBERS RECEIVE EXECUTIVE BOARD AWARDS OF MERIT

Awarded by the Executive Board for meritorious service to the American Electroplaters' Society, the Board voted its Award of Merit to two AES valiants, namely Rafael Diaz of the Pittsburgh Branch and Talmage R. Boggess of the Blue Ridge Branch. The presentation was made by National President W. Andrew Wesley at the Second Business Session of the Supreme Society held at the AES's 48th Annual Convention, Thursday, June 22, 1961.

Mr. Diaz was thus honored for distinguished AES service as creator of the Society's last three Annual Speakers Lists.

Mr. Boggess was recognized not only for his leadership in the creation of the Blue Ridge Branch but for his generosity and devotion in giving each of the silver gavels that each AES National President has received upon assumption of command from his elected successor.

Talmage R. Boggess

LIFT! HELP YOUR BRANCH ATTAIN ITS MEMBERSHIP EXPANSION GOAL

BOSTON BRANCH WINS 1960-1961 MEMBERSHIP EXPANSION COMPETITION

The Boston Branch (First Division), the Dallas-Fort Worth Branch (Second Division), and the Blue Ridge Branch (Third Division) prevailed in their respective divisions in the AES Annual Branch Membership Expansion Competition for the 1960–1961 AES Competition year.

Accordingly, an award of $50 was presented at the AES 48th Annual Convention, Boston, to each of these Branch divisional winners for achieving the greatest net membership expansion during the 1960–1961 AES Competition period in their respective divisions.

For the 1960–1961 Competition year (according to National Headquarters records as at May 31, 1961), the leaders in the AES's respective divisions were:

BRANCH	Members June 1, 1960	New Members	Net Change Membership (See Note)	Per Cent Change
FIRST DIVISION (126 members and over)				
1. Boston	149	38	+35.0	22.8
2. Los Angeles	332	34	+25.5	7.7
3. Hartford	167	35	+ 3.0	1.8
SECOND DIVISION (70-125 members)				
1. Dallas-Ft. Worth	71	35	+32.5	45.8
2. San Francisco	90	31	+27.5	30.5
3. Sydney	92	16	+16.0	17.4
THIRD DIVISION (10-69 members)				
1. Blue Ridge	41	36	+34.5	84.1
2. Denver	47	13	+ 6.0	12.8
3. Kansas City	58	10	+ 6.0	10.3

NOTE: After reconciling "New," "Reinstated" and "Transferred in" members with "Resigned," "Suspended," "Died" and "Transferred Out" number. Net change is computed by rating "Transfers" at 0.5.

EXECUTIVE BOARD APPOINTMENTS TO AES's BUSY BOARDS AND COMMITTEES

To AES standing Boards and Committees for three-year terms effective with the First Business Session of the Society held during the recent 48th Annual Convention, the Executive Board appointed these AES stalwarts:

EDITORIAL BOARD:
Myron B. Diggin, Dr. Frederick A. Lowenheim, George J. Marotta. Also Joseph M. Andrus (1 year)

EDUCATIONAL COMMITTEE:
I. Laird Newell, Rene Sonnenfeldt (One more to be appointed)

HONORARY MEMBERSHIP AWARD COMMITTEE:
Ralph D. Wysong, Milton Nadel (2-year terms)

MEMBERSHIP COMMITTEE:
William C. Giesker, Richard C. Watson, Irvin M. Weiss. Also Bruce Leslie (Australian Consultant) and Gordon A. Lince (Canadian Consultant)

PUBLICATIONS COMMITTEE:
Dr. Russel E. Harr, William H. Safranek (One more to be appointed)

PUBLIC RELATIONS COMMITTEE:
Donald Allie, James H. Lindsay, Vernon Schaeffer. Also Guy C. Cummings Jr. (To fill one year unexpired term)

RESEARCH COMMITTEE:
William P. Innes, Harold A. Kahler, R. Scott Modjeska

SCIENTIFIC ACHIEVEMENT AWARD COMMITTEE:
Dr. Charles L. Faust, Dr. A. Kenneth Graham

To each, AES extends congratulations and the hearty wish that his tenure will be bright. PLATING MAGAZINE joins in these good wishes.

ROCKFORD BRANCH HONORS NICK SERVATIUS

by
ALEXANDER ALEXANDER
Rockford Branch Publicity Chairman

More than 85 members and guests of the Rockford Branch gathered at the Faust Hotel in Rockford, on May 8, to pay their respects to Nick Servatius, founder of Modern Plating Co., Freeport, Illinois, with a testimonial dinner in his honor. Dispensing with all regular Branch business, this "Nick Servatius Night" was one of the best kept secrets since the atom bomb.

Mr. Servatius was brought to Rockford from his home in Freeport, by Father Arthur O'Niel, pastor of St. Thomas Aquinas Church of that city, under the pretext of visiting the Bishop and was taken completely by surprise when he was ushered into the special dining room where the assembled Branch members greeted him by singing "For He's a Jolly Good Fellow." With moist eyes and choking voice, Nick announced that while he had come to kiss the Bishop's ring, he now wanted to kiss his friends.

After President Harold Ellis welcomed Nick he introduced the members of his party which consisted of Father O'Niel; Richie Servatius, his son; Cliff Stearns, superintendent of Modern Plating and its first employee; and Rudy Hazucha of the Clinton Company, one of Nick's closest friends who sponsored him for American citizenship.

Photos of Modern Plating Company showing their vast and specialized equip-

(*Continued on page 829*)

MILWAUKEE (FORMERLY JUNEAUTOWN): SITE OF AES's 49th ANNUAL CONVENTION (1962)

Although the Indians around Milwaukee saw their first white men in the Seventeenth Century, it was not until the late 1700's that early fur traders set up shop in what is today's Milwaukee area. And it may have been as late as 1822 that Solomon Juneau moved to the east side of the Milwaukee River and founded Juneautown, now Milwaukee.

Today, the metropolitan area of Milwaukee has a population of more than a million. A great industrial center, Milwaukee of the "Nineteen Sixties" boasts plants manufacturing electric generating, transmission and distribution equipment; construction and mining machinery; agricultural equipment; structural metal products; castings; forgings; general industrial machinery; autos and parts; beer and malt and food products.

To Milwaukee, for the fourth time in the Society's 52 year history, American Electroplaters' Society, Inc. (AES) will bring its 49th Annual Convention. Sponsored for AES by the Society's Midwest Regional Council composed of AES's chartered Chicago, Milwaukee, Mississippi Valley, Rockford, St. Joseph Valley and St. Louis Branches, with Milwaukee as Host Branch, this will be the first time that an AES National Convention will be arranged for the Society by an AES Regional Group instead of by a single AES chartered Branch.

The Milwaukee Convention will occur from June 24–28, 1962. It will boast an outstanding Educational Sessions Program being created for the Editorial Board, and under its supervision, by a Host Educational Sessions Committee headed by Joseph Andrus (Chicago Branch) with Vincent Matacotti (Milwaukee Branch) as Vice Chairman. It will have noteworthy Ladies and Children's Programs; Plant Tours and many "off duty" relaxational and fellowship events.

Activities of the 1962 AES Convention will be held in Milwaukee's Hotel Schroeder.

Herman A. Tessmann of the Milwaukee Branch is the Convention's General Chairman aided by Vice Chairmen Ralph D. Wysong (St. Joseph Valley Branch) and Leonard Weeg (Rockford Branch).

(Left) Cliff Stearns, top left, superintendent of Modern Plating, Fr. Arthur O'Niel, pastor St. Thomas Aquinas Church, Freeport, Ill., rear center, and Richie Servatius, rear right, look on as Harold Ellis, president of Rockford Branch, AES, presents a "This is Your Life" type book to Nick Servatius, lower right, at a Branch testimonial dinner on the 25th Anniversary of Modern Plating Co., Freeport, Ill., which Nick founded. (Right) Long time friends of Nick Servatius, center, view the book compiled by Rockford Branch. At left is Henry Bornitzke of Milwaukee Branch in which Mr. Servatius is an Honorary Member. At right, Rudy Hazucha of Chicago Branch who sponsored Mr. Servatius for American citizenship.

SAN DIEGO INSTALLED AS 60TH BRANCH OF THE AES

All identification left to right. (1) George Loch, First Vice President and Librarian; James Gregory, Delegate; John P. Nichols, National Executive Secretary; Nick Carter, Sergeant-at-Arms and member, Board of Managers; Harry Steinke, President; Walter L. Dornbusch Jr., Secretary; Chester G. Borlet, National First Vice President; Stanley Townsend, Treasurer; Richard De La Cruz, member, Board of Managers. (2) San Diego Branch installation banquet at Del Coronado Hotel, Coronado, California on May 20, 1961. (3) Allen Hitch, Harry Steinke, Harry Martin, Robin Goodenough, Mayor of Coronado, extending greetings; John P. Nichols and Chester G. Borlet. (4) Harry Steinke, first President of the new Branch. (5) San Diego City Councilman Allen Hitch welcomes the new Branch to the San Diego environs; Messrs. Nichols and Borlet, Mayor and Mrs. Goodenough. (6) Messrs. Hitch and Steinke, Master of Ceremonies Harry Martin, Messrs, Nichols and Borlet, Mayor and Mrs. Goodenough. (7) Branch President Steinke receives permanent charter from National First Vice President Borlet. (8) First slate of San Diego Branch Officers: Harry Steinke, President; George Loch, First Vice President and Librarian; Walter L. Dornbusch Jr., Secretary; Stanley Townsend, Treasurer; Richard De La Cruz, Board of Managers; Nick Carter, Sergeant-at-Arms and Board of Managers; James Gregory, Board of Managers. (9) Delegates and Alternate Delegates: Richard De La Cruz, Fred Wheeler, James Gregory, George Loch, Walter Dornbusch and Henry Steinke.

SAN DIEGO BRANCH UPGRADED TO CHARTERED STATUS AT NOTEWORTHY INSTALLATION MEETING

In the last two decades, it is estimated that the population of the San Diego (California) area has burgeoned from approximately 200,000 to over a half-million, and that electroplating, metal finishing and allied arts have grown commensurately in that area. Opinion holds, moreover, that the continued large progress of both appears predictable.

Against that background and those prospects, the Executive Board of American Electroplaters' Society, Inc. permanently chartered the Society's new San Diego Branch effective April 1, 1961, and the Branch was officially installed as AES's 60th Branch at an outstanding Installation Meeting held in the Del Coronado Hotel of nearby Coronado Beach, Saturday evening, May 20.

With a large audience of AES San Diego members and prospective members, their families and their guests present, including a large segment of the leadership and rank and file of AES's Los Angeles Branch, the significant event was opened by Master of Ceremonies Harry (Happy Hare) Martin, popular San Diego radio commentator, with the greetings of California Governor Edmund Brown. Mayor Robin Goodenough of the City of Coronado and City Councilman Allen Hitch of San Diego next personally welcomed AES and its infant San Diego Branch to the area. Branch Secretary Walter L. Dornbusch, Jr. then presented the biography of the Branch as terminal point of the event's first phase.

The formal installation ceremony next followed. National Executive Secretary John P. Nichols presented the story of AES, and indoctrinated the Branch as to its duties, responsibilities and anticipated potential. National First Vice President Chester G. Borlet then installed the group as AES's 60th chartered Branch and presented its laminated permanent charter to it. Branch President Harry Steinke accepted in behalf of the San Diego Branch.

National First Vice President Borlet then installed, as San Diego Branch's first permanent officers, President Harry Steinke, First Vice President and Librarian George Loch, Branch Secretary Walter Dornbusch, Treasurer Stanley Townsend and Board of Managers Richard De La Cruz, Nick Carter and James Gregory.

Announcement was next made by National Executive Secretary Nichols that San Diego Branch's first Delegates and Alternate Delegates had been accredited by the AES Credentials Committee and these, namely Delegates Richard De La Cruz, Fred Wheeler and James Gregory and Alternate Delegates Harry Steinke, George Loch and Walter Dornbusch were then oriented as to their duties and responsibilities. Past National President Francis T. Eddy and Los Angeles Branch Past President Earl G. Coffin collaborated with him in the indoctrination.

General Program Chairman was George Loch ably aided by Nick Carter (Entertainment); Richard De La Cruz (Decorations); Walter Dornbusch (Correspondence) and Stanley Townsend (Finance). Distinctive San Diego brooches were the ladies' favors. The Arthur Murray dancers provided entertainment. The applications of a number of new members were received. Both an aggressive Active and Sustaining Membership promotion program is about to be launched, and there is prospect of the early formation of a Branch Ladies Auxiliary.

Among AES members from other Branches present was Claude C. Weekly of the Los Angeles Branch who did so much to help San Diego Branch leaders create the Branch. Others of the Los Angeles Branch present included Frank Virgil, George J. Hetz, Tony Stabile, David F. Seymour, Earl J. Arnold and Gene Mills—plus William Griff, Founder-First President of the AES's Phoenix Branch.

IMPORTANT TO AES BRANCHES AND BRANCH SECRETARIES

1. **A complete certified roster of your Branch Members in good standing as at June 30, 1961 must, by AES Bylaw provision, be in the hands of the National Executive Secretary on or before July 15, 1961. That list should include every member for whom your Branch paid Per Capita Tax in the July 1, 1960-June 30, 1961 fiscal year, including all new members, all reinstated members and all members "transferred in" during that period, minus all suspended, all resigned, all died or all "transferred out" members from July 1, 1960 through June 30, 1961. Upon arrival of your Branch list and its reconciliation with National Headquarter's records, your Branch will then promptly be billed by National Headquarters for Per Capita Tax for the fiscal year July 1, 1961-June 30, 1962 (References: AES Bylaws: Part I, Article V, Section 3, and Part II, Article V, Sections 4 and 5.)**
2. **You have received a Return Sheet to convenience your report to National Headquarters as to your elected 1961-1962 Branch Officers. If you have not yet executed and returned yours, please do so by return mail.**

AMERICAN ELECTROPLATERS' SOCIETY, INC.

Certificate of Twenty-Five Year Membership

AWARDED TO

BY THE _____ BRANCH OF THE SOCIETY

FOR THE BRANCH

AES's NEW "CERTIFICATE OF 25-YEAR MEMBERSHIP"

AES Branches have been invited to purchase copies from National Headquarters, if they like, and themselves to personalize and award them to any of their members in good standing whom they determine respectively have 25-year or more longevity as AES members.

INTERSOCIETY NEWS

ENGINEERS PREDICT DIRECT CURRENT TRANSMISSION BY 1985

The possibility of using direct current for transmission of electric energy within the next quarter of a century was raised at the Summer General Meeting of the American Institute of Electrical Engineers in Ithaca, N. Y. on June 21.

It may be that for transmission, "direct current, which was the dream of Steinmetz many decades ago, will come into its own," R. C. Mildner and John J. Grebe, of the Dow Chemical Company, Midland, Mich., told an AIEE insulation symposium in a technical paper.

"It has been estimated that by the end of 1985 the installed generating capacity of this country may be as high as 875 million kilowatts, that is about five times the present installed capacity," they pointed out. "It is therefore certain that there will be continued pressure to strengthen transmission and distributing systems, and to increase the maximum load that can be handled by individual cable lines.

"The increased powers that have to be handled call for the use of even higher voltages for transmission and primary distribution and it may be that, for transmission, direct current, which was the dream of Steinmetz many decades ago, will come into its own. In Europe experience is being gained in the operation of the dc transmission technique that have been developed, and it may be that solid rectifiers based on the super-purity silicon, which is coming into ever-increasing production, will make their contributions in this field."

♦

ELECTROFORMING SYMPOSIUM PLANNED FOR DALLAS

The Subcommittee on Electroplating Practice of the American Society for Testing Materials Committee B-8 will hold a Symposium on Electroforming in Dallas, Texas, probably during February 1962.

Dr. Edward B. Saubestre of Enthone, Inc. is the chairman of the Subcommittee. A. D. Squitero of the International Nickel Company, head of the Electroforming Section of the Subcommittee, is the initiator of the Symposium, which is titled "Electroforming—Its Applications, Uses and Properties of Electroformed Metals."

A comprehensive program is already in preparation. Walter L. Pinner is the chairman of the Symposium. Authors interested in presenting papers should correspond with Mr. Pinner at The McGean Chemical Company, 1250 Terminal Tower, 50 Public Square, Cleveland 13, Ohio.

PLATING MAGAZINE TECHNICAL ARTICLE REPRINTS AVAILABLE

To maintain PLATING MAGAZINE's high standard, each and every technical article that you read in PLATING has been critically appraised and approved by a panel of experts on that specific subject before PLATING acceptance for publication.

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NACE 1962 CONFERENCE AND SHOW IN KANSAS CITY

National Association of Corrosion Engineers will hold its Eighteenth Annual Conference and 1962 Corrosion Show in Kansas City, Mo., March 19–23, 1962.

Robert H. Goodnight, Cook Paint and Varnish Works, North Kansas City, Mo. will be in overall charge of both the conference and corrosion show. He was appointed by NACE President E. C. Greco, United Gas Corp., Shreveport, La.

L. W. Gleekman, Wyandotte Chemical Corp., Wyandotte, Mich., is technical program chairman, supervising arrangement of technical symposia in which a wide variety of papers on corrosion will be delivered. Hundreds of corrosion engineers also will meet in technical committees to discuss their common problems.

The technical program and Corrosion Show will be held in the Kansas City Auditorium, with the Muehlebach Hotel as headquarters. NACE held its 1954 Conference and Corrosion Show in Kansas City.

♦

WASTE DISPOSAL GUIDE BY MANUFACTURING CHEMISTS

The latest in a series of safety guides, SG-9, on the disposal of hazardous wastes, is now available from the Manufacturing Chemists' Association, Inc.

The pamphlet outlines recommended safe practices and procedures for disposal of flammable liquids, toxic and corrosive materials and other substances which may create an air or stream pollution problem.

The safety guide recommends that both a "hazard index" and a "disposal index" be established which would set out both the hazards of the waste material and the proper method for disposal.

The safety guide also urges that all waste disposal procedures be placed under the responsibility of one individual or department and that the plant safety organization act in a consultative capacity. Cooperation of the industrial hygienists or medical division also is required, the safety guide states.

SG-9 is available from the Association at the headquarters office, 1825 Connecticut Ave., N.W., Washington 9, D. C. for 20 cents a copy.

♦

CHEMICAL INDUSTRIES EXPOSITION ADVISORY COMMITTEE NAMED

Announcement has been made of the Advisory Committee for the 28th Exposition of Chemical Industries naming E. R. Weidlein, of Pittsburgh, trustee of the Mellon Institute of Industrial Research, as chairman.

This year's exposition, at the New York Coliseum, November 27 to December 1, will be the largest ever held in this country. Already, some 520 exhibits are planned with more in prospect, to occupy all four floors of the Coliseum.

Members named to the Advisory Committee include: Roger Adams, head, chemistry department, University of Illinois; Cecil H. Chilton, editor-in-chief, "Chemical Engineering"; Arthur C. Cope, president, American Chemical Society; John V. N. Dorr, Dorr Consultants; Howard Farkas, vice president, U. S. Stoneware Co.; R. P. Genereaux, engineering department, E. I. du Pont de Nemours & Co.; C. E. Griffith, president, Salesmen's Association of American Chemical Industry, Inc.; John J. Healy Jr., president, American Institute of Chemical Engineers.

Also, Raphael Katzen, chemical engineer; Richard L. Kenyon, editorial director, ACS Publications; Sidney D. Kirkpatrick, consultant; Henry B. Linford, president, The Electrochemical Society; Walter E. Lobo, consultant; Robert B. MacMullin, senior partner, R. B. MacMullin Associates; W. T. Read, consultant; N. A. Shepard, consultant; Julian C. Smith, professor, chemical engineering, Cornell University; E. K. Stevens, manager, Exposition of Chemical Industries; John C. Vaaler, chairman, Editorial Board, "Chemical Processing"; Lincoln T. Work, president, The Chemists' Club.

H-VW-M duplex plating cuts rejects 28% ...cuts costs besides

Collis Company of Clinton, Iowa, found a way to satisfy exacting customer demands, get better product appearance, cut rejects and greatly improve corrosion resistance by switching from copper-nickel-chrome to H-VW-M duplex plating. Collis found that two nickel baths (plus chrome) cost no more.

Superintendent of Finishing Walter R. Barrett switched to Levelume 220 as a top coat over Permalume for Collis' freezer racks and other wire goods and got these advantages:

- Rejects down 28%. No treeing, no pitting, a much more uniform plate
- Over 25% lower brightener costs
- 12¢ per lb. of nickel deposited with Permalume
- 18¢ per lb. of nickel deposited with Levelume 220

Mr. Barrett adds: "Duplex plating's the answer to higher corrosion resistance and better looks. For *superior* duplex at lower cost, it's Permalume and Levelume 220."

For further evidence, contact H-VW-M.

H-VW-M *Progress in metalfinishing through advanced processes • equipment*

Hanson-Van Winkle-Munning Company, Matawan, New Jersey • Offices in Principal Cities

Alert Supply Company is H-VW-M in the West • Los Angeles • San Francisco

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 720.

INDUSTRY NEWS

ALLIED RESEARCH SALES MEETING

Left to right, seated, H. Van Buren, C. Reilly, B. Hawhee, L. Camill, district sales manager; J. A. Cairns, vice president in charge of sales; R. Marce, W. Gross. Standing, R. Clement, T. Smolinski, T. Richards, J. Horner, J. Wickering, R. Sweeney, G. DeCario, W. Ohst, R. Fenwick, J. Pollack.

"Selling in a Recession" was the theme of the semi-annual central district sales meeting of Allied Research Products, Inc., held recently in the Detroit-Leland Hotel, Detroit, under the direction of the district sales manager, L. J. Camill.

During all the sessions, stress was laid on the fact that "quality" and "service" constitute the true values of a product—not price. The supervisors of the various manufacturing departments of Allied also presented a proposed program for the coming year.

J. A. Cairns, Allied's vice president in charge of sales, summarized the entire meeting and presented the company's goals and aims for 1961.

The guest speaker, Kenneth Bement, vice president, marketing, for the Burroughs Corporation, Detroit, gave the key address on the subject of "The Salesman as a Professional."

BARRETT CHEMICAL APPOINTS TWO NEW DISTRIBUTORS

The Barrett Chemical Products Company, Inc., Shelton, Connecticut has announced the appointment of W. M. Fotheringham, Inc., 975–81 Niagara St., Buffalo, N. Y., as a non-exclusive distributor of the Barrett sulfamate nickel plating process. Other currently active distributors in the New York State area are the Udylite Corporation; Don Blum & Company, Inc.; and Austin F. Fletcher, Inc.

Barrett has also announced the appointment of the Hardie Trading Coy. (N.Z.) Ltd., Auckland, New Zealand as a distributor of its sulfamate nickel plating process. Hardie Trading Coy., Ltd. has supplied and serviced the electroplating industry of New Zealand for the past 25 years.

♦

FILTER MANUFACTURING FIRM ORGANIZED

The formation of Wallace Filters, Inc., Lebanon, Indiana, was announced May 1 by Charles I. Wallace, former president of Indiana Commercial Filters Corporation, Lebanon.

The new firm will design, manufacture, develop, distribute and sell all types of industrial filters.

Mr. Wallace, associated with filtration more than 25 years, prior to his affiliation with Indiana Commercial Filters, was vice president and general manager of Houdaille-Hershey of Indiana Lebanon plant. From 1936 to 1954 he was with U. S. Hoffman Machinery Corporation, Syracuse, New York and from 1939 to 1954 was general manager of the Industrial Filtration Division.

Other associates in the firm are Mrs. Mary N. Wallace, secretary-treasurer; J. E. Lewis, formerly chief engineer of Indiana Commercial Filters, and E. O. Wolgast, formerly assistant to the general sales manager of Indiana Commercial Filters.

♦

WESTERN BRASS BECOMES OLIN BRASS IN NAME CHANGE

A trade name prominent in the metals industry for 45 years—Western Brass—is being changed. The new name is Olin Brass, Olin Mathieson Chemical Corporation announced. The products, customer services and sales policies associated with Western Brass for decades will not be affected by the change, but packaging materials, stationery, invoices, displays, signs and all other graphic forms of identification will be replaced in an orderly transition to the Olin Brass name.

The change is in line with the corporation's recently-announced identity program adopting the short two-syllable signature "Olin" for everyday use in preference to the full 12-syllable legal title. By putting the simpler Olin signature on most of its product groups, including metals, packaging and chemicals, the company hopes to eliminate as much as possible any confusion caused by an earlier excess of brand names and trademarks.

♦

METAL CLEANING SCHOLARSHIP ESTABLISHED

A new research scholarship program providing engineers with the opportunity for graduate study in metal cleaning operations and processes has been announced by its joint sponsors, the Phillips Manufacturing Company of Chicago and the Diamond Alkali Company of Cleveland.

The scholarship will be awarded on a yearly basis and will provide special funds and assistance for research study at the University of Pittsburgh. The two firms will continue the scholarship fund indefinitely to complete a long range investigation of degreasing equipment, solvents and methods; the chemical and physical changes occurring to chlorinated solvents, perchlorethylene and trichlorethylene, during the actual degreasing process with periodic reports on case histories of the more interesting and complex problems.

The first year's scholarship was awarded to Richard C. Fullerton. Mr. Fullerton received his BA in chemistry from Kenyon College, and served with the United States Air Force in Japan.

♦

MICHIGAN CHROME ACQUIRES ALLIED, HOLLYWOOD

Robert J. Huber, president of Michigan Chrome and Chemical Company, Detroit, has announced the acquisition of Allied Research & Engineering Company of Hollywood, California. Allied Research & Engineering is a leader in the new technology of electroforming and will continue in this field.

Paul Harper, formerly West Coast district manager for the Chemical Division of the parent company, has been promoted to general manager of Allied, which will operate as a wholly owned subsidiary.

INDUSTRY NEWS BRIEFS

STEVENS INSTITUTE HAS NEW ELECTRON MICROSCOPE

One of the world's most powerful electron microscopes will enable Stevens Institute of Technology metallurgists to study the smallest objects ever seen by man—molecules about 30 trillionths of an inch in size.

The new instrument is the fourth and highest-powered electron microscope to be added to Stevens' Electron Microscopy Laboratory. It will enable Stevens metallurgists to observe directly the building blocks of materials.

Metallurgy Professor Rolf Weil, in charge of electron microscopy at Stevens, will use the new unit initially to study thin films of electroplated metals. Almost invisible to the naked eye, these films are transparent under an electron microscope, thus revealing their internal structure.

The new microscope stands seven feet high and about four and a half feet wide.

Professor Weil, a Stevens professor since 1956, was one of the first in America to work with the electron microscopy of thin metals and the first in this country to study electroplated metals in this way.

♦

UNITED PLATERS STRIKE SETTLED

A four months strike of production employees at United Platers, Inc., 3456 Denton in Hamtramck, has been amicably settled, according to a joint announcement by Glenn H. Friedt Jr., president of the company, and Robert Cylka, business agent for the Union.

Employes of the plant, which was struck on January 3 over a dispute on economic issues, returned to work immediately. During the strike the plant has been operated on a reduced basis by supervisory and other non-union employes.

♦

NEW FINISHING SUPPLY FIRM FORMED

Announcement has been made of the formation of Products Finishing Supplies, Inc. The firm will manufacture and distribute supplies and processes to the plating, polishing, buffing and allied fields. A few of their suppliers are Federated Metals Division, Midwest Buff Mfg., Roberts Rouge Co., Armour Coated Abrasives and other well known firms.

Elmer Lundberg was named as president and general manager. He is a graduate of Purdue University and a past-president of the AES Indianapolis Branch. He has had 20-years experience in the metal finishing field. The firm is located at 2069 Martindale Avenue, Indianapolis, Indiana.

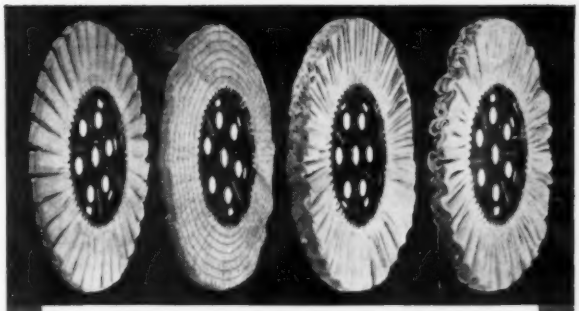
♦

DIVERSEY ACQUIRES CANADIAN FIRM

Purchase of Heather Chemical Products, Ltd., Toronto, by the Canadian subsidiary of The Diversey Corporation has been announced by Lewis Shere, president of the parent company. The purchase price was not disclosed.

The seven-year-old Heather company manufactures industrial metal cleaners and metal finishing compounds. Mr. Shere explained that Heather will operate under its own name as a wholly owned subsidiary of The Diversey Corporation (Canada) Ltd., which was formed by Diversey in 1939.

With acquisition of the Toronto firm, Diversey now has four plants in Canada. The others are located at Montreal, Clarkson and Calgary. Diversey also has pl..ts and offices overseas in Europe, Latin America and Australia.



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PATENT ABSTRACTS

DR. D. GARDNER FOULKE
SEL-REX CORPORATION
Nutley, New Jersey

Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

2,967,578, 1/17/61—NICKEL PLATING CERAMIC MATERIAL—J. Mochel, assignor to Corning Glass Works, Corning, N. Y.

Etch the ceramic, immerse in a solution containing Ni, Co or Pd ions, then in a reducing solution after which electroless nickel is deposited.

10 claims.

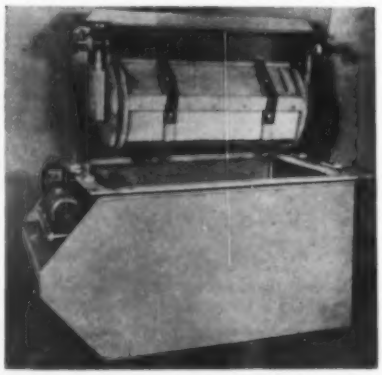
♦

2,967,791, 1/10/61—COATING ALUMINUM—R. Halversen, assignor to Parker Rust Proof Company, Detroit, Mich.

The use of a cation ion-exchanger to control the aluminum in a CrO_3 — F^- chromating solution is claimed.

16 claims.

PLASTIC PLATING BARREL



New Plating Barrel Designed to Meet the Present and Future Challenges of Plating Problems

Available in any size or style

Constructed of polypropylene, a virtually indestructible plastic, formulated into a one-piece welded unit which can be used safely in any plating solution and at any plating temperature. Tank linings, gears, hangers and cylinders also made of the same plastic.

Your barrel won't have to be taken out of production for unnecessary repairs such as broken or cracked panels, broken rails or door panels.

Write for a *free* sample of polypropylene. Put it through a rough hammer test before deciding to put a polypropylene unit in your production line.

NU-LITE PLATING EQUIPMENT CO., INC.
777 Meeker Ave. • STagg 2-3200 • Brooklyn 22, N. Y.

2,968,583, 1/17/61—CAPACITOR SECTIONS—C. Barth, assignor to Western Electric Co., Inc., New York, N. Y.

Vapor deposit silver and zinc on polyethylene at low temperature.

2 claims, figures.

♦

2,969,295, 1/24/61—CHEMICAL GOLD PLATING—J. Crishal and M. Melillo, assignors to Pacific Semiconductors, Inc., Culver City, Calif.

Immerse a metallic body in a potassium gold cyanide alkali metal carbonate or bicarbonate solution at a *p*H of 8 to 10.

11 claims.

♦

2,969,750, 1/31/61—LOADING-UNLOADING MECHANISM—C. Clark, assignor to the Udylite Corp., Detroit, Mich.

An apparatus for transferring racks for supporting workpieces in a plating machine back and forth between a loader for the machine and the shop conveyor is described.

9 claims.

♦

2,970,064, 1/31/61—MASKING MATERIAL—W. Bolton, assignor to Union Carbid Corp., N. Y., N. Y.

Dextron and a glycol is described as a suitable masking agent for gas plating.

4 claims, figure.

♦

2,970,090, 1/31/61—PLATING NICKEL ON ALUMINUM—J. C. Withers and P. E. Ritt, assignors to Melpar, Inc., Falls Church, Va.

Clean the aluminum, etch in HF then in HCl containing Mu S4 then plate in a nickel sulfate-magnesium sulfate-ammonium chloride nickel bath. After a heat-treating and activation steps plate additional metals on the article.

3 claims.

♦

2,970,935, 2/2/61—CHROMATING ASSIST—W. Cavanagh, Assignor to Parker Rust Proof Co., Detroit, Mich.

To maintain a hexavalent chromating solution in condition by gasing a rinse ahead containing chromic acid (0.01 per cent-0.1 per cent) with free acid of 0.05 to 1.0.

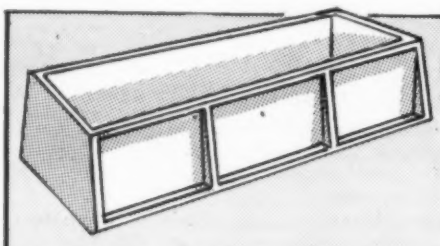
7 claims.

♦

2,970,951, 2/7/61—COPPER PLATING—J. Manquen and H. Brown, assignors to the Udylite Research Corp., Detroit, Mich.

The use of an acetylenic ether nitrile (0.02 to 0.1 g/l) in a copper cyanide bath to give bright deposits.

18 claims.



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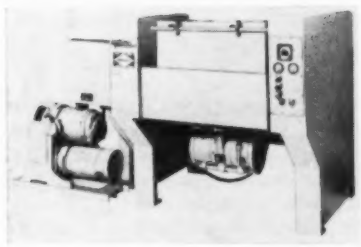
EQUIPMENT AND SUPPLIES



E—701. VIBRATORY METAL FINISHER—Jackson Vibrators, Inc., has introduced Jackson Vibrado units in sizes from 1/10 to 20 cu ft capacities, which will be distributed nationally by Abrado Finish Corp.

The new units, which are designed to clean, descale, deburr, radius, finish, burnish, color and abrade castings, forgings, etc., are backed by a full 12-month written guarantee. Vibrado finishers feature full radius roll-over tub design for most effective contact area, compact cut-back housing design for space saving, full 180° tilt for easy unloading, lower overall height for loading and unloading convenience, and controlled orbital flow pattern with synchronous vibration to provide improved finishing at greatest speed. The units require no special flooring for installation, operate quietly when mounted directly to plant floor.

E—702. PLATING BARREL—A new polyproplene plating barrel is announced by Nu-Lite Plating Equipment Co., Inc. It is constructed into a one-piece unit of virtually indestructible plastic, which, according to the manufacturer, can be used in any plating solution and at any plating temperature. The tank linings, gear hangers and cylinders are also made of the same plastic.

E—703. RUST PREVENTIVE—Patclin Chemical has just developed a series of water displacing rust preventives, for use in metal working and finishing shops as a rust preventive between operations. They are said to be especially applicable to prevent rusting after deburring, barrel cleaning and burnishing. Three grades are being offered, Patclin No. 404 leaves a light monomolecular film; No. 430 leaves a soft non-drying film; No. 431 leaves a hard waxy film.

The wet work is immersed in the proper water displacing rust preventive. The water is displaced and a film is deposited on the work.

No. 404 water displacer can be used after plating, to prevent staining and spotting out. In this case the rust preventive film is removed in a vapor degreaser.

E—704. SILVER-GOLD CLEANER—Margar Manufacturing Labs, Inc., announces a new and different type of cleaner, Margar electrical components grade silver-gold cleaner. This cleaner is specially formulated for use in the electronics, electrical, and associated metal finishing industries. It is a specialized product for the removal of tarnish or oxide discoloration on silver, gold and its alloys.

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For use in ANODIZING, PLATING & OTHER APPLICATIONS

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Cut to size at no extra cost
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SUBSTANTIALLY BELOW MILL PRICES

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WHY GUESS ?

MEASURE PLATING THICKNESS

to a millionth of an inch

Your profits depend on meeting tight specifications, maintaining quality control and reducing rejects. Can you afford to guess at plating thickness when it is so easy to *measure and be sure*?

UNITRON'S PL-MEC PLATER'S MICROSCOPE substitutes facts for uncertainty. The plated deposit is observed through a Filar Micrometer Eyepiece and measurements are read directly from a micrometer drum. This compact microscope is easy to use, portable around the shop and has a built-in light source. It also doubles as a metallurgical microscope for examining grain structure etc. at magnifications of 25X-1500X. Permanent photographic records may be made using an accessory 35mm. camera attachment and provide valuable legal protection for subcontractors.

UNITRON'S PLATER'S MICROSCOPE will save its initial cost many times over. Prove this for yourself — as so many firms in the plating industry have done—by requesting a **FREE 10 DAY TRIAL** in your own plant. There is no cost and no obligation.

Above: Accessory camera attachment. Left: Observing the plated deposit.

$468 Model PL-MEC complete with all optics and standard accessories	As above with built-in camera attachment, but without 35mm. camera back: **$540**

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Please rush UNITRON's Microscope Catalog 37-R

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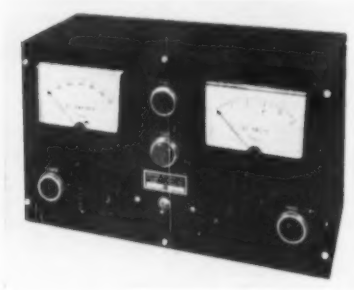
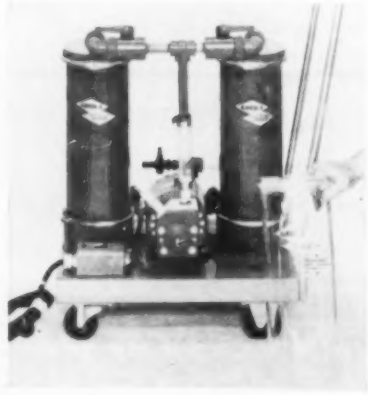
The manufacturer states that the silver-gold cleaner facilitates soldering, reduces contact resistance, improves appearance, is safe for all silver and gold, and can be used over and over.

E—705. RECTIFIER CONTROL—Dresser Electric Co. is introducing a new automatic average current density control for plating applications. The new control approaches, as nearly as possible, true automatic current density control on continuous production operations where racks have approximately the same area.



This control incorporates ammeter, voltmeter, automatic-manual switch, raise-lower push-buttons and average current density controls. Controls may be furnished integral with the rectifier or for remote operation.

E—706. GOLD RECLAIMING EQUIPMENT—The development of a new mechano-chemical device for reclaiming gold from electroplating solutions and rinses, available with integrated refining service, has been announced by Precious Metals Recovery Corp., an affiliate of Sel-Rex Corporation. Trade-named Aurion-X Gold Resin Reclaim, the equipment is said to be a fluid handling station utilizing twin-connected, clear lucite columns "charged" with PM/79 resins.



Aurion-X reportedly will remove over 97 per cent of the gold present in either alkaline or acid solutions in one pass—even from "open-end" cascade rinse systems.

When saturated, the lucite cartridges can be returned intact for processing as part of the reclaim-refine "package", according to the company. Stand-by cartridges are said to be easily fitted avoiding any interruption in reclaim-processing while original chamber contents are being refined.

E—707. BRIGHT NICKEL PROCESS—Metal & Thermit Corporation has announced a new process for plating bright nickel deposits. The process, a Watts-type bath that can be used with either air or mechanical agitation, gives high-brilliance deposits with excellent brightening rates and outstanding chromium receptivity.

Identified as M&T Bright-Nickel 30-W, the new process is said to offer nickel deposition control on a wide basis-metal range. It is further reported that stability of addition agents is assured over the 3.5 to 4.5 preferred *p*H range, even under varying operating conditions. Nickel sulfate, nickel chloride, boric acid and organic addition agents make up the bath solution.

E—708. BRIGHT DIP—A new process for polishing and descaling stainless steels of the AISI-300 series by means of simple chemical immersion has been announced by The Diversey Corporation.

Diversey reports that its new DS-9 bright dip process produces uniform specular finishes without use of current. In many cases, the company explains, satisfactory descaling and moderate brightening can also be achieved on other series of stainless steel.

The process reportedly removes heat-treat scale and welding scale. Silver and brass solder are not affected by immersion in the solution.

E—709. CONTROLLER—Barber-Colman, Wheelco Industrial Instruments Division, presents the Double-O, a new line of round chart recording and indicating controllers. The most popular features of the Barber-Colman, Wheelco electronic potentiometer line have been incorporated into one full-sized recorder-controller line for customer benefits.

The Double-O controllers are completely self-contained, null-balancing instruments requiring only an external sensing device. A wide range of models are available for the measurement, indication, control and permanent recording of temperatures. With proper circuitry and the use of transducers, such variables as speed, strain, hydrogen ion (*p*H) and other quantities which can be resolved into electrical signals can be recorded and controlled.

E—710. GOLD SAVING UNIT—Technic, Inc., has announced development of a new gold saver to recover cyanide or alkaline gold which up to now has been lost in the conventional plating process.

With the development of Resin C-150, Technic Gold Savers are able to recover any type of gold which formerly was lost in the "dragout"—or rinsing—step in the plating process. The new unit traps between 100 and 125 troy ounces of gold for each resin charge.

The unit circulates the dragout solution through the resin column, which, by ion exchange, recovers the gold previously lost. When the resin is saturated with gold, its color changes. The resin is then removed, sent to a refiner for recovery, and the column may be recharged with fresh resin.

E—711. ZINCATE PROCESS—A new simplified method of plating on aluminum utilizing a dilute zincate solution has been developed by Enthone, Inc. The new zincating bath, known as Alumon "D", is made up at a concentration of only 1 lb/gal of Alumon "D" salts. Compared with the viscous 4 to 5 lb/gal conventional zincate bath, it is claimed to be easier to make up, is freer rinsing, penetrates more readily into grooves, blind holes, and screw threads; reduces dragout; and minimizes carryover of zincate into subsequent plating baths.

In laboratory tests on identical aluminum parts, the amount of solution dragged out of an Alumon "D" bath was less than one-third the amount dragged out of a conventional zincate solution; due to the lower concentration, the amount of dissolved salts lost through dragout was less than one-twelfth the amount lost from the conventional bath.

Used after cleaning and acid dipping, Alumon "D" simultaneously activates the aluminum and deposits a thin, dense, uniform zinc film. This film can then be electroplated with copper, nickel, or other deposits with excellent adhesion. Immersion times in the Alumon "D" vary from 15 sec to 2 min at room temperature.

E—712. METAL COATING—A new water-white, clear protective finish for chromium, silver, brass, aluminum, zinc, steel and other metals, has been announced by Universal Paint & Varnish, Inc. Known as Universatile No. 8058, this easy-to-use coating has exceptionally good adhesion and toughness. Can be air or bake-dried to a hard, high-gloss finish.

Remittance must accompany all book orders placed with AES Headquarters.

Organic Coating Technology-Volume II. Pigments and Pigmented Coatings, by Henry Fleming Payne, 689 pp. (675–1363) Nonmembers $17.50; AES Members $15.35.

Henry Fleming Payne's Volume II of ORGANIC COATING TECHNOLOGY—PIGMENTS AND PIGMENTED COATINGS is a very valuable extension to his previously published Volume I—Oils, Resins, Varnishes, and Polymers.

Professor Payne is in charge of organic coatings research and technology at the University of Florida. The reviewer feels that his 35 years of diversified experience in paint and related industries has made him an outstanding authority in organic coatings. He is eminently qualified to tackle the extremely complex problem of preparing this concise survey of pigmented coatings. The more than 600 references given in this volume are testament to Professor Payne's thoroughness of coverage of the field.

This volume contains a very logical development of pigmented coatings from an initial general discussion of fundamentals through detailed discussions of types of pigments, why pigments are used, the principles of coatings formulation, coatings production, and the various specific applications and end uses for coatings.

The first chapter on fundamentals discusses the principles of color, hiding power, pigment particle size, pigment dispersion, oil absorption, pigment concentration, and the relation between them. It describes the effect of pigmentation on paint properties.

There is an excellent chapter on white pigments which discusses their manufacture, composition, relative properties, and the advantages of each type in paints. A chapter on extender pigments tells of their importance and where and why they are used. Extender pigments are discussed in relation to such paint properties as consistency, leveling, pigment settling, gloss, structural reinforcement, and moisture transmission.

Color pigments are discussed in two general categories: inorganic and organic. They are further classified broadly as natural or earth colors and synthetic or chemical colors. Composition, manufacture, crystal form, shape, and particle size distribution are included in the discussions. The important properties reviewed are brilliance of color, resistance to fading, chemical resistance, hiding power, tinting strength, tendency to "bleed", toxicity, durability, flooding, floating, and ease of dispersion. There are also separate chapters devoted to the black pigments and metallic pigments.

A chapter on paint formulation and production discusses binder and vehicle characteristics, additives in paints, and paint manufacture, including the steps in production and the types of equipment used with numerous illustrations.

The chapter on preparation of surfaces before painting and methods of application is a worthwhile addition to this volume. It presents a brief but broad survey of treatments for many types of surfaces and numerous methods for applying coatings, with many illustrations.

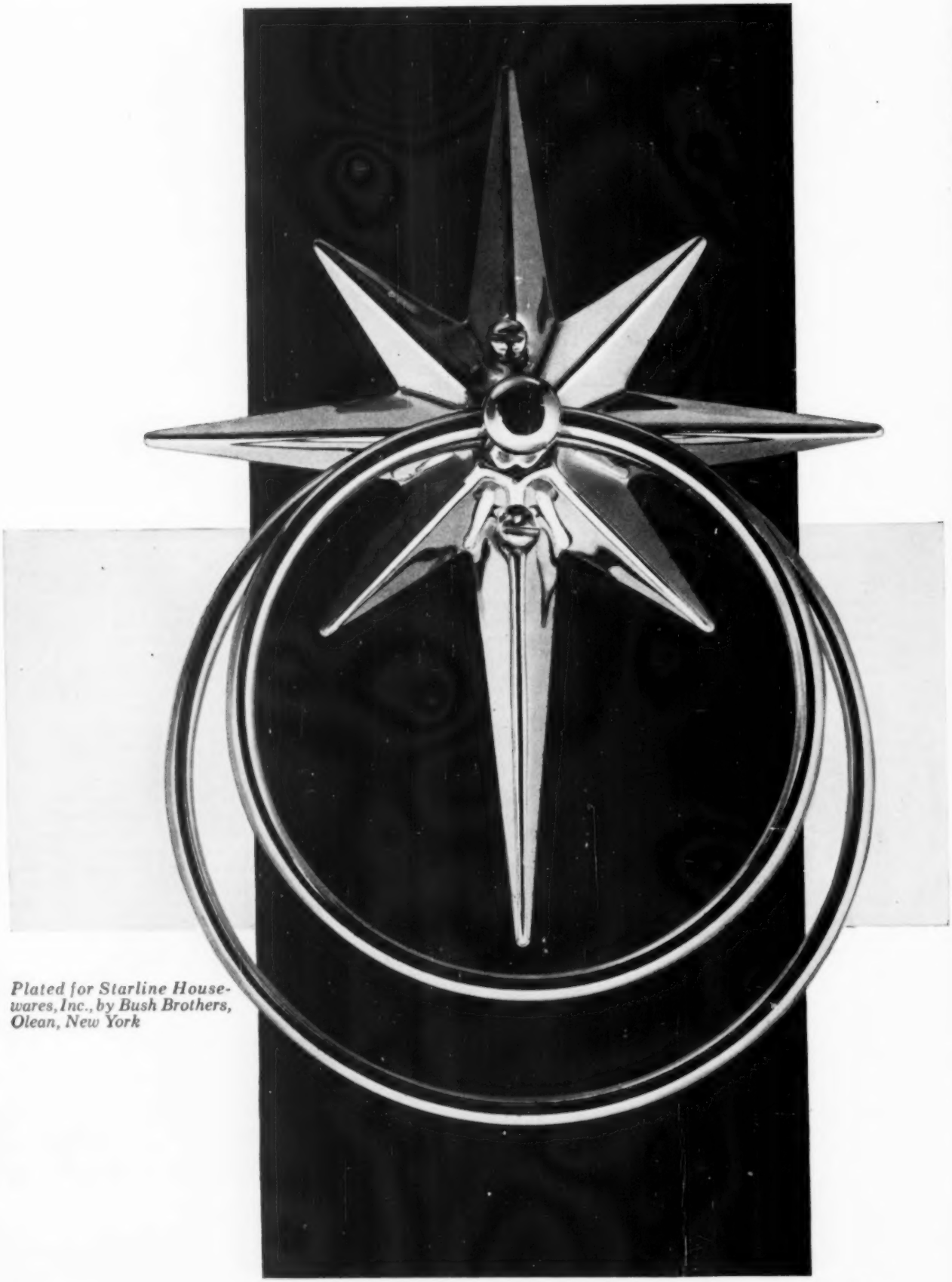
The chapter on architectural paints discusses the various types used: exterior paints for wood, interior paints for plaster and wallboard, exterior paints for masonry, enamels for wood and concrete floors, and fire retardant paints. Some typical formulations are given. The characteristics of various wood surfaces and their relations to paint durability are discussed along with various causes of paint failure.

The chapter on industrial finishes can be expected to give no more than a brief general discussion because of the enormous complexity of this field. Almost every manufactured article receives some type of finish and there are literally thousands of industrial paint formulations. Professor Payne has chosen to give general discussions of several representative types of industrial finishes as follows: clear finishes for wood and metal; white finishes for kitchen cabinets, refrigerators, and washing machines; colored finishes for automobiles, metal furniture, and utensils; finishes for the metal-decorating and can-coating industry; finishes for plastics; finishes for textiles; finishes for paper; novelty finishes including wrinkle, hammer, multicolor, and crystalline. A substantial number of typical formulations are included with the discussions of the coatings.

The discussion of corrosion inhibitive paint systems also presents serious problems because of the vastness of this field. However, Professor Payne has written an excellent survey of this subject. The chapter goes into the mechanism of corrosion and corrosion control. Typical examples and formulations of corrosion-resistant primers, and paints are given. The types of coatings discussed include bituminous, coal-tar epoxy, phenolic, amine-cured epoxy, epoxy-polyamide, vinyl, chlorinated rubber, neoprene, hypalon, thiokol, fluoro- and chlorofluoroethylene polymers, and polyurethane.

The book should be valuable both to paint technicians and to technical people in other fields who have an interest in coatings. It should prove to be particularly beneficial to those metal finishers who desire to obtain more than a passing knowledge of organic coatings. The book is well written and should be easy to read, even by those who are not versed in coatings technology. The sections on preparation of surfaces, methods of application, industrial finishes, and corrosion-resistant paint systems should be of special interest to the metal finisher.

L. J. NOWACKI
Battelle Memorial Institute
Columbus, Ohio



Plated for Starline Housewares, Inc., by Bush Brothers, Olean, New York

NO DEGREASING
NO DEBURRING
NO COPPER PLATING
NO COPPER BUFFING
on this nickel-chrome plated fixture

...just chrome over
SUPERLUME
on a raw steel stamping

It used to take *six* operations to get the high-luster finish demanded by Starline Housewares for this chrome-plated towel ring. Now it takes only *two.*

Difference in finish quality? *Absolutely none,* agreed the plating experts who scrutinized random samples from batches produced both ways.

Maybe Superlume belongs in *your* plant, too. This high-leveling, super-bright nickel bath is economical with most die castings and virtually all high-grade steel products. For technical details on these and other money-saving uses, ask H-VW-M.

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PERSONALS

GERALD A. SMITH, formerly president of his own company, Smith Plating Equipment Co., Providence, R. I., has joined Sel-Rex Corporation, Nutley, N. J., as sales engineer in New England. Sel-Rex now has four sales and service technicians working out of their New England office-laboratory located at 105 Bellows Street, Warwick Industrial Park, Warwick, R. I.

Mr. Smith has been active in the electroplating equipment and supplies business for over 20 years. After war-time service in the U. S. Army from '42–'46, he was employed by several of the country's leading jewelry manufacturers as plating foreman from 1946–1957. For the next two years, till 1959, he put his practical experience to work as equipment sales engineer and plating consultant.

In his new position, he will report directly to Oscar Stocker, his company's New England District Manager. He is a member of the American Electroplaters' Society and the Providence Jewelers' Club.

G. A. Smith

G. S. Corigliano

G. S. CORIGLIANO, manager, marketing division, Sel-Rex Corporation, Nutley, N. J., has been elected president of the Association of Industrial Advertisers, New Jersey Chapter, his term of office to run from June 1961–June 1962.

A graduate of Columbia University, Mr. Corigliano has held executive positions in marketing and advertising for nearly 15 years. Prior to his current post, which he has held for over 6 years, he was sales engineer for processing equipment, assistant sales manager, sales-promotion manager, and manager, advertising and sales-promotion, for national companies marketing technical or engineered products.

In addition to his activities with the Association of Industrial Advertisers, he was voted Advertising Man Of The Year 1960–1961 by that organization; Mr. Corigliano is also a member of the American Marketing Association and the Direct Mail Advertising Association. He has addressed various business and fraternal organizations on advertising and marketing subjects and, as staff lecturer, department of marketing, Rutgers University, has taught classes in advertising, sales and sales-promotion, and industrial marketing.

Mr. Corigliano has won several awards for his promotional activities since he joined Sel-Rex in April of 1955, including "Best Direct Mail Advertising Campaign 1959" from AIA, N. J. Chapter, and three "Highest Readership Awards" for advertisements promoting his company's precious metal plating processes to the electronics industry.

(Continued on page 830)

FOR SALE

REASONABLY PRICED

Complete Fully Automatic

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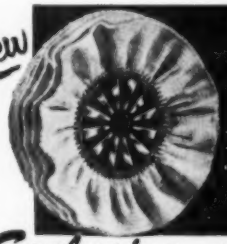

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BRANCH NEWS

Total AES Branches U. S., Canada, Australia, June 1, 1961—60.

BLUE RIDGE

Officers Elected for 1961-1962

The regular monthly meeting was held May 5 in the Winston-Salem Room of the Hotel Robert E. Lee in Winston-Salem, N. C. Branch President, **Bruce Wallace** presided over the business meeting.

The election of officers for 1961-1962 was held. Those elected were: **Michael Milo,** president-librarian; **Carl Witherspoon,** first vice president; **Roy Lewis,** second vice president, and **Donald McGee,** secretary-treasurer. Also elected to serve on the board-of-managers was: Bruce Wallace, **Walter Conine** and **Dr. Nelson Murphy.**

The Branch decided to elect a sergeant-at-arms this year. **C. M. "Moose" Butler** was elected as the first person to ever serve in this capacity for Blue Ridge.

Two new members were elected.

After the business meeting, those attending were taken on a tour of the cigarette manufacturing facilities of the R. J. Reynolds Tobacco Co.

Donald H. McGee
Secretary

BRITISH COLUMBIA

Eddy Speaks on Job Shop Management

The regular monthly meeting was held at the Yorkshire Inn, Friday, April 21st with 26 members and guests present.

The guest speaker, **Francis T. Eddy** of TELautograph Corp. of Los Angeles, gave a very interesting talk on Job Shop Organization and Management, followed by a stimulating discussion period.

Branch President **Gordon Smith** presented certificates to the prosperous students of our night school classes for their accomplishments. Congratulations to the students and also to instructor, **Walter Kellerman,** for another successful term.

Claus Schlossareck
Secretary

BUFFALO

Donaldson Heads New Slate of Officers

The Buffalo Branch held its final meeting of the 1960-1961 season on Friday, May 12, 1961 at the Niagara Manor Restaurant, Buffalo, N. Y.

Feature of the evening was installation of new officers conducted by Buffalo Branch Past President **Rolland Campbell** in the absence of National Third Vice President **Frank Beuckman.**

President **Harold Shapiro** had each of the present officers outline a brief description of his duties and discuss same at the group meeting.

Rolland Campbell called each of the new officers forward, introduced him and gave a brief resume of the duties expected of him. Following this the past and new officers were given a rising vote of thanks.

The new officers are: President, **John Donaldson;** first vice president, **Richard Davis;** second vice president, **John Tiebor;** third vice president, **Matthew Hayes;** secretary, **Robert Eich;** educational chairman, **George Wolf;** treasurer, **Melvin Stachura;** sergeant-at-arms, **Ray Blechinger;** board of managers, Harold Shapiro, Rolland Campbell, and **John Scholterer.**

President Shapiro thanked all the officers that served with him for a job well done and turned the meeting over to the new president, John Donaldson.

President Donaldson made a brief acceptance speech and then advised that during the new season we will have at least one meeting in Warren, Pa., and another in Jamestown, N. Y., along with industrial tours, one of which is planned at Sylvania Electric in Warren, Pa.

Rolland Campbell stated Buffalo was not represented at the Interim Meeting to bid for the 1967 National Convention.

First Vice President Davis announced the Librarian will henceforth be titled as the Educational Chairman.

Robert C. Eich
Secretary

CAPITOL DISTRICT

Rectification Explained by Viola

The May meeting was held at the Circle Inn, Latham, May 1. There were 15 members present.

Fred Infield, chairman of spring outing, reported everything was in order for the steak roast at Endries.

The slate of officers for 1962 was introduced by the nominating committee. They follow: President, **Edwin Frieberg;** vice president, **Art Eisner;** second vice president, **Dom Dagnoli;** secretary, **Micheal Opar;** treasurer, **Edward Legere;** recording secretary, **Walter Bently;** librarian, **John Courtemanche.**

After the business meeting, **James Viola,** president of Rapid Electric Co. gave a very educational talk on "Rectification Today in the Plating Industry."

Edward Legere

CHICAGO

Plant Visits to Western Electric and Amphenol-Borg

The Chicago Branch held their second "Plant Visitation Day" on Friday, May 12. The members had a choice of visiting two plants. The Western Electric plating plant in Cicero, Illinois and Plant No. 2 of the Amphenol-Borg Electronics Corp. located in Broadview, Illinois. Members were told to assemble between 1:00 and 1:30 p.m. at the plants. **Dr. Russ Harr** planned the tour at Western Electric and **Joseph C. Corre** planned the tour at Amphenol. The two plants showed complete finishing operations in production electroplating at its modern best. The tours were highly educational and enlightening to everyone. The members were treated to coffee and doughnuts in the cafeteria at Amphenol after the tour. Mr. Corre and the writer conducted a question and answer period for all the visiting members of the Branch during the coffee-klatch.

The business meeting was held at Petricca's Restaurant after dinner about 7:30 p.m. **Matt Dassinger** thanked all the officers for their help during his tenure of office. He then handed over the gavel to our new president, **Rudy Hazucha,** with best wishes for good luck. Rudy introduced the other officers who were present: Joseph C. Corre, first vice president; **Art Bartman,** second vice president; **Paul Glab,** secretary-treasurer. **Charles Geldzahler,** librarian, was not present at the meeting. Three new memberships were handed over to the board of managers for approval. There is no scheduled technical session for June but the usual business meetings will be held during the summer months. This concludes the last session for the season of 1960-61 and will resume in September—bye-now!!

Christopher Marzano
Publicity Chairman

CINCINNATI

Trip to MacGregor Golf Club Plant

The April 26 meeting was an inspection trip through the MacGregor Division of Brunswick Corp. manufacturer of golf clubs and balls. Many different finishing operations were seen, including a Harperizer which is used to put the final finish on the iron club heads prior to plating. The plating operations consisted of copper and

BRANCH SECRETARIES

Branch News is required of all Secretaries monthly by AES Bylaws. First of the month is Branch News deadline for next PLATING issue. Any items on hand on that date will be carried in that edition. Later arrivals will appear in the issue immediately following. In reporting talks given by speakers before the Branch, please give titles of the talks, the speakers' full identification and any other pertinent information of interest to other Branches and PLATING's broad readership.

◀ INDICATE A 734.

chromium. The group came away from the trip realizing that there are many operations necessary to make quality golf clubs and balls.

David L. Kaplan
Secretary

DAYTON
Fenburr Talks About Paint

The Dayton Branch held a dinner meeting May 17 at Kuntz's Cafeteria with 29 members and guests present. During the business meeting, the Auditing Committee reported having examined the books to find them in proper order. **Walter Anderson,** Tri-State Representative, reported on tentative plans for a panel discussion to be held next fall in Cincinnati.

The following officers were elected for the coming year: President, **Lawrence H. Hadlock;** first vice president, **Walter W. Anderson;** second vice president, **Duane Prosser;** secretary, **Albert W. Wendt;** treasurer, **Norbert Mollman;** librarian, **Paul Allison.**

Following the election Larry Hadlock presented a past president lapel pin to retiring President **Byron Bowman** and introduced the seven past presidents present at the meeting.

Librarian Walter Anderson reported on the plans for another Mixed Monte Carlo Night to be held Saturday night, June 3 at the Delco-Moraine Gun Club. This being "Organic Coatings" night, he then introduced the speaker of the evening, **Dr. Herbert L. Fenburr,** chief engineer, Hanna Paint Company, Columbus, Ohio.

Dr. Fenburr chose as his topic "Paint and Its Ramifications." His talk traced paints and related finishes from their early beginnings to the present-day coatings in plain language understood by all present yet giving sufficient technical information to be of interest to those more advanced in the field. A spirited discussion followed the talk.

L. A. Critchfield
Publicity Committee

DENVER
New Officers Installed; Chemical Milling Movie Shown

The Denver Branch met May 12 at the Oxford Hotel. Following the dinner a short business meeting was held. The following officers were elected and installed for the 1961-1962 year: **Rober Whyman,** president; **James Jenkins,** first vice president; **Peter Lucatuorto,** second vice president; **Curtis Johnson,** secretary; **James Lewis,** treasurer; **Earl Goecker,** librarian; **Robert Martin, Lawrence Major** and **Edgar Hotchkiss,** board of managers.

Following the meeting, a movie was shown on "Chemical Milling" by courtesy of the Turco Products Co. **Thomas Stark** of the Martin Co. answered specific questions on operating details of the process.

Elmer Schuster
Secretary

HARTFORD
United Aircraft Plating Plant Visited

The final Branch meeting of the season was a tour of the plating facilities of the United Aircraft's East Hartford plant arranged by **Ralph McCahan** and **Walter Acker.** Preceding the tour, 108 members and guests had dinner at the United Aircraft cafeteria.

Plant guides took the various groups through the plant and the following plating operations were seen: Acid copper, cyanide copper for stop-off purposes for carburizing, conventional and high speed chromium baths, the plating of aluminum and stainless steel with nickel from a chloride bath followed by cadmium or silver and in some cases by indium which is then heated in an oven for diffusion purposes. In some cases nickel was being plated and over this cadmium was deposited and diffused into the nickel for better corrosion resistance. Tin plating and barrel nickel, cadmium and silver baths were in operation.

The application of various stop offs such as hot wax, masking tapes, stop off

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lacquers, neoprene plugs, etc. were demonstrated. The use of electronically controlled equipment to control the purity of the rinse water was effectively shown. A pilot plating set up was also seen and the testing of a jet engine topped off the evening tour.

Stanley Platoz
Secretary

INDIANAPOLIS
Bender to Receive 25-Year Award

The May meeting was held on Thursday, the Fourth, instead of the first Tuesday. Attendance was a little less due to the change of dates. This was a temporary arrangement for the May meeting only. Twenty-five enjoyed the usual good dinner and several members came later for the meeting. **John Gregory** and **Orie Thompson,** General Insurance Co. of America, representatives were present and Mr. Thompson talked on "Insurer's Version of Safety Engineering." He told how costs could be raised or lowered by any business by its safety program. Various items of safety engineering included physical examinations, protective clothing, eye baths and showers, identification signs, lunch room safety, tank protection and ventilation, the last being the most important. When an accident happens, major or minor, the insurance company wants to know "Why." Usually someone caused the accident to happen. The real cause should always be found.

The business meeting opened with **John Holland** presiding. The treasurer gave a monthly and a yearly report. It was announced that **Richard Watson** had been appointed as a member of the National Membership Committee.

The newly appointed bylaws committee reported through Mr. Watson, chairman, that a skeleton form had been drawn up and much work had been done. He made a motion, which was passed, that the president appoint a committee to write a set of bylaws and present them in September. The same committee was appointed that had been working on the bylaws: Mr. Watson, **Les Reynolds** and **Quentin Shockley.**

Les Reynolds announced that the only member of our Branch who has had 25 years of continuous service to the Society is **Roman Bender** and that a certificate will be awarded to him. This was put into a motion by Mr. Reynolds and seconded by **John Hood** and passed.

Robert Stewart, senior member of Tri-State, announced that the Toledo, Ohio Branch was petitioning the Tri-State to become a member.

Two new members were voted into the society by a motion made by Mr. Reynolds and seconded by **Fritz Anderson.**

Election of officers followed and the following persons were elected by acclamation: President, Robert A. Stewart; first vice president, **Mark M. Trook;** second vice president, **Robert Smith;** librarian, Richard Watson; secretary, **Edna Rohrabaugh;** treasurer, Frederick Anderson; board of managers, **Edward Bruck, John Hood, Ronald Pardieck,** Roman Bender, and John Holland, ex-officio.

The board of managers was increased from three to four members.

John Holland, retiring president, thanked all who had helped him during his term of office and congratulated the incoming officers. Robert Stewart, new president, thanked all who had voted for him and for their confidence in him.

Nello Arterburn brought the matter of the late **Tom Evans'** membership and wanted to know if this could be transferred to **Mrs. Ruth Evans** who is carrying on the business, but as this cannot be done she will be kept on the mailing list.

Edna Rohrabaugh
Secretary

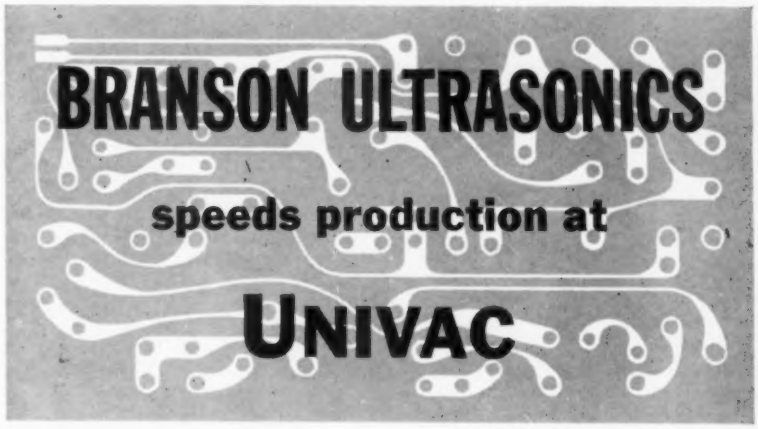
LANCASTER
Geesey Steps Into Branch Presidency

The regular meeting of the Lancaster Branch was held on Friday, May 12, at the Barbecue Cottage East in Harrisburg.

Past President's pins were awarded to **Harry Hovis, John Reynolds** and **Charles Snyder.**

The secretary reported on the results of the questionnaire and survey, which indicated that there was no single night which everyone could attend but there was a slight preference for Friday evening—Wednesday and Thursday were next in favor.

The Ladies Night was generally very well accepted, all of the members who attended having indicated that they enjoyed the affair. A map of the area was displayed, showing the geographic distribution of our members and the number that are within driving distance of various



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meeting locations. It was concluded that, although fewer members live in the York Area than in either Lancaster or Harrisburg, York was a convenient "middle ground" and that additional meetings would be scheduled there next year.

A letter from the Waterbury Branch was read to the membership suggesting that the AES participate in the rewriting of appropriate military specifications. It was of no interest on the part of the membership participating in this program and it was suggested that other groups such as the ASTM could handle the matter.

President **Sharretts** turned the gavel over to the new president, **George Geesey.** President Geesey's first official act was to present Mr. Sharretts with a past president's pin.

Following the business portion of the meeting, our guest of honor, **Charles Snyder,** presented an illustrated talk of his recent around-the-world tour. The color slides taken in such places as Majorca, Egypt, Ethiopia, India, Ceylon and Singapore were of unusual beauty and interest.

There were 35 members and 2 guests present.

Martin S. Frant
Secretary

LOS ANGELES

Mintz on Printed Circuits; Officers Installed

The Los Angeles Branch met at Rodger Young Auditorium on Wednesday evening, May 10. The meeting opened at 8:30 by **Frank Virgil** with 84 members and guests attending. Seven guests were introduced by Sergeant-at-Arms **Bob Jones.**

The membership report given by **Emmett H. Babcock** included names of four new applicants. **Earl Coffin** installed the new officers: Emmett Babcock, president; **Harvey Hunt,** first vice president; **Don Baudrand,** second vice president; **Harold Wanamaker,** secretary; **Bob Pooler,** treasurer; **Gene Bosl,** educational chairman. The new board of managers is composed of immediate past president Frank Virgil, **Norman Painter** and **Truman Stoner.**

Truman Stoner presented a past president's pin to Frank Virgil and for a job well done, a clock radio was also given to him.

Emmett Babcock received the gavel, took over as president and continued the meeting. He appointed **Bill Pardee** and **Dan Ross,** educational assistants; **Burt Adams,** publicity chairman; **Bill Lidtke,** research chairman; **Bob Jones,** sergeant-at-arms.

Don Baudrand introduced the speaker for the evening, **Bob Mintz** of Wildberg Bros., who gave a very good, educational talk on "Printed Circuits." A very lively question-and-answer period followed.

Harold P. Wanamaker
Secretary

LOUISVILLE

Vacuum Metalizing Presented by West

Our regular dinner meeting was held on April 20 at Hasenours Restaurant. Among the 27 members and guests attending were eight visitors from the IBM Co. at Lexington. The annual election of officers for 1961-1962 was conducted. The new officers elected were: President, **James Smith;** first vice president, **Harlan Bowsher;** second vice president, **Frank Lamping;** corresponding secretary, **Lawrence Endicott;** recording secretary, **Charles Whitt;** treasurer, **Gordon Blue;** librarian, **Kenneth Reifsteck;** board of managers, **Herbert Rembold, Stanley Beyer,** and Kenneth Reifsteck.

Announcement was made that for a May meeting the Branch would convene in Lexington where the speaker will be **Ezra Blount,** editor of *Products Finishing.*

Our speaker of the evening was **James West,** regional field sales manager of the F. J. Stokes Corp. His subject was "Vacuum Metalizing" and he described the basic principles of the process, the development of high vacuum equipment needed in it. Many types of fixturing were shown to accomplish quality and efficiency throughout the preparation of the surface before vacuumizing different types of material, the depositing of various elements and the final protective coating with organic finishes. Some samples of unique applications created added interest.

Arthur A. Oertel
Recording Secretary

MELBOURNE

Sheill Speaks on Anodizing For Architecture

The regular Branch meeting for April was held as usual at the Royal Melbourne Technical College and 56 members and guests were present.

The guest speaker for the evening was **Don Sheill,** managing director of Anodizers (Aust.) Pty. Ltd., and the subject "Anodizing for Architecture."

Mr. Sheill showed two interesting films on aluminum and the designs and decorative effects that can be achieved from dyed anodized aluminum, and then spoke about the troubles that had been encountered in anodizing for architectural purposes, and the importance of proper sealing above all else to ensure that the anodized coating would show good weather resistance. This was further illustrated by aluminum test pieces with both thin and heavy anodic coatings and with poor and good sealing. Salt spray testing of these samples had proved that the properly sealed coating was best even when the thickness of the coating was well below the specification.

All aluminum racks were used in preference to either all titanium racks or titanium-tipped-aluminum racks because the volume of a particular aluminum section to be anodized for architectural purposes did not justify the extra expense involved in the use of titanium.

The process and dyes used and requirements in plant and temperature control, etc., were also discussed by Mr. Sheill, and after a question and answer period the meeting was adjourned for supper.

G. J. Perkins
Secretary

MILWAUKEE

Foley Made Branch Honorary Member

At its meeting on May 12, the Milwaukee Branch elected **John C. Foley** as an Honorary Member. Mr. Foley, formerly foreman of the plating department of the National Autolite Company in La Crosse, Wisconsin, has been a devoted member of the Branch since 1929. For many years he has regularly made the 450-mile round trip to attend meetings.

At the May meeting the following officers were elected for the coming year: **Art Linn,** president; **Clinton Host,** first vice president; **John Auchter,** second vice president; **Leslie Diveley,** secretary-treasurer; **Curt Hunsaker,** librarian and program director; **Sy Taterzynski,** manager for three year term; **Leslie Diveley, Robert Steuernagel** and **Herman Tessmann,** delegates. They will be installed at the meeting on June 7.

The application of **Charles H. Nelson** was approved and he was welcomed as a member of the Branch.

The proposal to change the bylaws to increase the per capita tax was discussed. On the whole, the members were dismayed to learn that AES's failure to regularly increase dues to keep in step with rising prices was endangering the existence of the Society. The Delegates were instructed to support realistic dues for the National Society.

A panel lead by **Frank Marshall** conducted a discussion of the subject "Cost Savings in Finishing Operations." The panel consisted of **Henry Bornitzke, Herman Tessmann,** and **Martin Tenenbaum.**

Leslie Diveley
Secretary

MONTREAL

Mitwol Discusses Rectifiers; Rennie Death Mourned

The regular monthly meeting of the Montreal Branch was held at the Sheraton Mount Royal Hotel on Monday, April 17.

The speaker for the evening was **Sid Mitwol,** general manager, Electrical Division of the Meaker Company of Nutley, N. J. Mr. Mitwol gave a very interesting talk on "Rectifiers."

The Montreal Branch was greatly saddened by the sudden death of their Presi-

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dent **John Rennie** on Tuesday, April 18, 1961. His absence will be greatly felt by the Montreal Branch.

G. Katronge
Secretary

PHILADELPHIA
Darrow Discusses Color Anodizing

The regular meeting was held on May 22 at Beck's Restaurant with 47 at dinner and about 65 at the meeting opened at 8:30 by Branch President **Cogan.** Following introduction of guests by First Vice President **Irvin Hauseman,** two men were admitted as active members. The minutes of the previous meeting were read, following which the speaker, **George R. Darrow,** finishing engineer, Reynolds Metals Co., was introduced by Librarian **Donald Marsh.** The subject was "Six Steps to Successful Color Anodizing."

Mr. Darrow's six steps were: racking, cleaning, chemical treatment, anodizing, dyeing and sealing. Each step was described in detail and large charts were used to give in clear outline the subject matter being discussed.

Treasurer **John Ross** gave his report; the secretary gave the report on the 1961 Banquet program book ads. **William Burkette** reported on the arrangements for the Ladies Night party, June 9. **Paul Mentzer Sr.** expressed his thanks for the Branch's remembrance during his recent illness. The secretary read an acknowledgment card from **Francis Perazza,** who also had been recently ill. It was reported that **William Moyer** was admitted to the Mayo Clinic and was seriously ill.

Robert Farren in behalf of the board of managers nominated Paul Mentzer Sr., former Branch secretary, treasurer and delegate, for Branch Honorary Membership. This was seconded by **Dr. Samuel Heiman** and carried unanimously.

The following were elected for the 1961-62 term: President, Irvin K. Hauseman; first vice president, **Joseph W. Berenato Jr.;** second vice president, **George B. Valentine Jr.;** secretary, **I. Wm. Marcovitch;** treasurer, **John R. Ross;** librarian, Donald H. Marsh; board of managers, **John J. Lopardo** (2 years), James E. Cogan Jr. (3 years); Delegates, Dr. Samuel Heiman, I. Wm. Marcovitch, Irwin K. Hauseman; Alternate Delegates, James E. Cogan Jr., Joseph W. Berenato Jr. and John R. Ross.

Mr. Cogan thanked all who worked with him during his two years as Branch president and wished Mr. Hauseman every success. Dr. Samuel Heiman installed the new officers and turned the gavel over to Mr. Hauseman, who called Mr. Cogan to the dais and presented him with a past president's pin. Mr. Hauseman stated that Mr. **Trusdell's** suggestion made at the previous meeting to limit terms of office to one year would be discussed at the next Executive Group meeting. He asked the secretary to make arrangements for a Philadelphia Branch breakfast at the Boston Convention on Tuesday, June 20, to start work on the Branch meetings programs for the 1961-62 season.

I. Wm. Marcovitch
Secretary

PHOENIX
McDermaid Shows Film On Abrasive Belts

The May Meeting was held at the Arizona Ranch House Inn at 5614 North Central Avenue, with 18 members and guests present. After a baked ham dinner, President **Floyd Huhn** called the meeting to order.

Guests present were **Seymour B. Lonyai** of Fidelity Chemical Products, **Dee McDermaid** of Behr-Manning, and **Don Porter** and **Robert Bentley** of General Electric.

It was unanimously agreed that the Phoenix Branch would support the Dallas-Ft. Worth Branch in its efforts to obtain the National Convention in 1967.

John Mularkey and **Les Meeker** discussed plans for the swimming party in July.

The election of officers for the coming year was held with the following results: President, **James Weaver;** first vice president, John Mularkey; second vice president, **Paul Wible;** secretary, **Ron**

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The business meeting was followed by a film presented by Dee McDermaid of Behr-Manning Company on the subject of Coated Abrasive Belts.

Paul M. Wible
Secretary

PROVIDENCE-ATTLEBORO
Penman Discusses Work Simplification

The April meeting was held in the Providence Engineering Building on Angell Street. The meeting was called to order by President **Dan Turner.**

In the short business meeting, Mr. Turner appointed **Pete Lonsbury, Jerry Noonan** and **Doc. Parker** to act as the nominating committee for the following year.

The speaker of the evening was **Robert Penman** of Texas Instruments. His talk was "Work Simplification" as practiced at Texas Instruments. He had a thorough knowledge of his subject and by making his audience take part in his talk, made us all a little more alert to the possibility of the use of Work Simplification in our own endeavors.

There was a long question period at the end of the program.

Clifford I. Healy
Secretary

PROVIDENCE-ATTLEBORO
Naval Air Station Visit Informative

Instead of the usual monthly meeting in May, President **Daniel Turner** arranged a plant visitation at the Quonset Point Naval Air Station.

A group of 32 assembled at the main gate of the N.A.S. and we were driven by bus to the overhaul and repair department. We were taken on a tour of this large installation and shown how a plane enters at one end, moves along in stages, and leaves either completely overhauled or rebuilt.

However, when the platers reached the two plating shops, it was easy to see that although planes and their overhaul are interesting, plating is much more interesting to the plater. We were allowed to roam and ask questions freely and that is just what the majority did.

Our thanks to the U. S. Navy and Commander Hagerty for an enjoyable morning.

Clifford I. Healy
Secretary

ST. LOUIS
Morris Talks on Nickel Plating

The regular monthly dinner meeting of the St. Louis Branch was held at the York Hotel, Wednesday evening, April 12. There were 27 members and guests present for dinner. There were 35 present when the business meeting was called to order by President **George Koderhandt.** One new member was accepted on a motion by **William Piel,** second by **James Kelly** that passed unanimously.

Andy Julius attended the Midwest Regional meeting held in Milwaukee. He reported we should attend the 1962 convention to see what progress the Midwest Regional has made. He also suggested our branch support **E. E. Oberland** for Third Vice President.

Chairman **Robert Coulson** reported the nominating committee consisting of himself, **Craig McAlister** and **John Moran** had decided to recommend the following slate which was elected for the ensuing year: President, **Homer Thomen**; first vice president, **Pete Young**; second vice president, **Donald Koehler**; librarian, **Charles Hamm**; secretary, **Ward Kelly**; treasurer, **Louis Berra**; sergeant-at-arms, **Robert DeGuire**; board of managers; **Andy Julius, George Koderhandt** and **Richard Gotsch.** No nominations were made from the floor.

It was suggested that **Ken Robins** install the officers at the May 6 Banquet. Chairman Koderhandt approved and motion was made, seconded and passed unanimously.

The following Delegates and Alternates to take office after 1961 convention were selected. Delegates Andy Julius, Louis Berra, and George Koderhandt; Alternates, **William Piel, Craig McAlister** and **Robert Coulson.**

A lengthy discussion was held relative to the possibility of each member being mailed a list of the members of the St. Louis Branch including home addresses and phone numbers. It was pointed out that our program for the annual banquet includes the membership roster with the addresses the members prefer to use for

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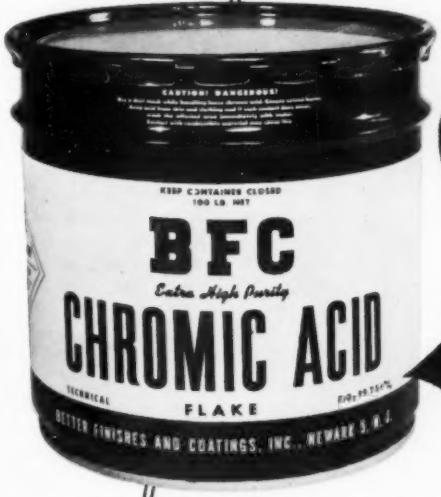

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their correspondence. A motion was made by Homer Thomen, seconded by **Wayne Gregory,** that each member be mailed a banquet program after the banquet. Librarian Ken Robins introduced **Don Morris** of Hanson-Van Winkle-Munning Co., who talked on "Recent Developments in Bright Nickel Plating and Industrial Nickel Plating." There were numerous questions after the talk. A rising vote of thanks was given Don for an interesting talk.

Ward Kelly
Secretary

Photo courtesy of John J. Bunsic

Southern Tier Branch members toured the plant of the Adding Machine Division of National Cash Register Co. at Ithaca, N. Y.

SOUTHERN TIER
Tour Plant of National Cash Register

The Southern Tier Branch enjoyed their annual plant tour, high above Lake Cayuga, through the National Cash Register Co., Adding Machine Div., May 16, at Ithaca, N. Y.

Librarian **Bill Potter** and **Jack McCarthy,** of National did a splendid job in arranging the tour. About 25 members and guests attended.

Ed Hollister, guided us to the many interesting points in the manufacture of adding machines, including automatic barrel plating, barrel deburring, automatic rack plating and electrostatic painting.

After a very interesting tour, **R. G. Fowler,** plant manager, gave a brief talk for the company on operations. **Arthur O'Brien,** northeastern sales manager, explained the advantages and operation of their latest in bank check filing and accounting machines, using actual exhibits.

Dinner and refreshments were enjoyed at the Mariland Hotel in Ithaca, with the meeting ending at eight o'clock.

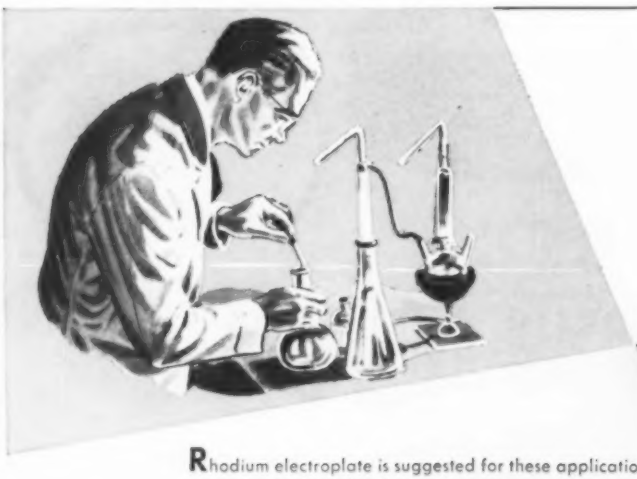
John J. Bunsic
Secretary

WESTERN ONTARIO
Dobson Elected President; Beneficial Discussion Held

The May meeting was held at the Wm. Pitt Hotel, Chatham with 12 members and guests present. President **Jim Kelly** presiding. This being the last meeting till fall and also election of officers there was no speaker. The nominating committee presented the following slate of officers for 1961-62 who were duly elected: President, **Robert T. Dobson;** vice president, **R. A. Campbell;** secretary-treasurer, **James H. Marshall;** librarian, **Edward Brown.**

Following the election of officers a general discussion took place on our Branch as it stands today. Those present represented the majority of the so-called "die hards" of the Society and a very interesting and beneficial session followed. This proved to be one of the better meetings of the year in that we have to unceasingly keep planning ahead for the future and betterment of our Branch.

Bob Dobson
Vice President



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ROCKFORD BRANCH HONORS NICK SERVATIUS

(*Continued from page 805*)

ment were shown, together with pictures of Nick's new home with special emphasis on the "walk-in bath tub." These photos had been taken with the assistance of the graphic arts department of Woodward Governor Co. and Nick had been told that they were needed for a Branch promotional activity.

President Ellis then turned the meeting over to William "Bill" Geissman who acted as Master of Ceremonies. He read a host of telegrams and letters from friends and well wishers who were unable to attend, and then told of Nick's early beginnings as a polisher in Germany, his coming to the United States and his early days in the job shops of Chicago, Elgin and Aurora before the tides of fortune brought him to Freeport. Bill then called on Fran Lanz, president of Northwestern Plating Co., Chicago who spoke of Nick's early days when he worked for his father at the Old Northwestern Plating Co. on his first American job.

Next, Henry Bornitzke of Cutler-Hammer, the "grand gentleman" of the Milwaukee Branch which made Nick an Honorary Member in 1956, told the story of the time at the National Convention in Milwaukee when Nick first divulged that he had been plating white brass years before anyone else in the industry but hadn't announced it to anyone other than his own customers.

Rudy Hazucha, who has been associated with Nick longer than anyone else in the trade, spoke of Nick's many contributions to the industry and to the Society and told the story of Rentrap Plating Co., Nick's first venture into business in an old saloon which they made over into a job shop. Rudy called attention to the fact that Rentrap spelled backwards reads "Partner" and there were more partners than available money.

Father O'Niel mentioned the Christian philosophy of employe relations which has made Modern Plating a good place to work, while Cliff Stearns, one of the company's first employes and now its superintendent, told of the early days of Modern Plating which, founded in the dark days of the 1936 depression, has grown to its present stature due to Nick's "think big-do big" philosophy. Richie Servatius thanked the group for this tribute to his father.

A framed plaque commemorating the occasion was presented to Nick by President Harold Ellis who then turned the meeting over to the guest of honor who not only expressed his deeply felt thanks but regaled the audience with many hilarious stories of his early days in the metal finishing industry, his experiences along the way and the founding in May 1936 of Modern Plating Co.

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PERSONALS

(Continued from page 818)

ROBERT C. TREES has been named vice president, marketing by the board of directors of The Udylite Corporation.

Mr. Trees joined the Udylite organization in 1943 and was formerly director of advertising. His responsibilities include corporate advertising, public relations, sales promotion, and market research activities.

After graduating from DePauw University, Mr. Trees attended Columbia University where in 1923 he received his BS degree in business administration. He is presently a member of the Engineering Society of Detroit, American Electroplaters' Society, Detroit Press Club and is a past president of the Industrial Marketers of Detroit.

R. C. Trees

R. J. Brown

ROGER J. BROWN has been appointed a district manager of Frederic B. Stevens, Inc. Mr. Brown will make his headquarters at the new Stevens office and warehouse at 597 Northland in Buffalo, New York.

Mr. Brown has been a metal finishing sales representative for Stevens since 1956. Prior to that time he was employed at the Stevens office in Detroit as coordinator of all full automatic machine and still tank equipment sales.

He attended the University of Detroit, and during World War II, served in the U. S. Air Force.

♦

FLAVIO J. LA MANNA has been elected president of Climax-Grayway Corp. of Paramus, N. J. In this capacity, Mr. La Manna will direct the company's growth and expansion in the manufacturing of printed circuits for military and commercial applications, and also direct the subsidiary Climax Plating Co., in its operations of precision plating to high standards and specifications.

Mr. La Manna has been an electroplating consultant for many years in the Newark area, and recently was technical director of Allegri Tech, Inc., Nutley, N. J., manufacturers of printed circuit boards. Prior to that, he was chief chemist at Electrical Industries, Murray Hill, N. J., overseeing its plating department and laboratory in the production of semiconductor devices for the electronics industry. He also worked for Bart Manu-

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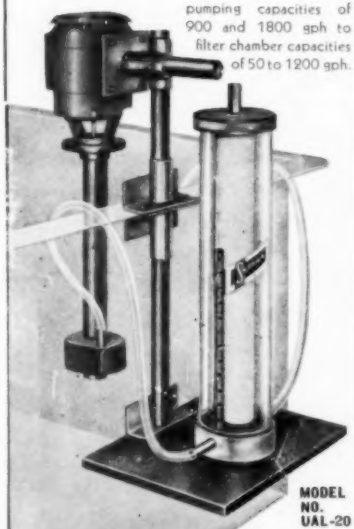

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facturing Corp., Bellevue, N. J., for six years as research and development chemist.

Mr. La Manna is a member of the AES, having served as secretary of the National Electroplating Course Committee, is second vice president of the Newark Branch, chairman of the Newark Branch Electroplating Course Committee, editor of the Newark Branch Electroplating Course Manual. He is an Alternate Delegate for the Branch, and serves as an intermediary, for an unofficial employment agency for platers in the Newark area. Mr. La Manna is a member of the ACS, British Institute of Metal Finishers, the Etched Circuits Society of America and is Commander of American Legion Post 382 in Montclair, N. J. He is a graduate of George Washington and Seton Hall Universities.

♦

KENNETH R. OSBORN has been appointed to the newly-created post of director of industrial development of Allied Chemical's General Chemical Division. In his new post, Mr. Osborn primarily will be concerned with investigating promising new products and expediting their commercial production.

With the division 26 years, Mr. Osborn was chief engineer for the past two years. He previously served for six years as consultant to the technical director and was manager of industrial development for three years.

An alumnus of Stevens Institute of Technology in Hoboken, N. J., Mr. Osborn holds a mechanical engineering degree.

F. J. La Manna

K. R. Osborn

♦

WILLIAM J. ZUBRISKY, formerly executive vice president of Chromium Corporation of America, has been elected president and chief executive officer. He succeeds **DONALD H. BISSELL,** who has been named chairman of the board.

JOSEPH J. CASSIDY, formerly assistant treasurer, has been elected controller.

Both Messrs. Zubrisky and Bissell have been associated with the firm for more than 35 years. They have been instrumental in the growth of industrial chromium plating.

Mr. Zubrisky has his headquarters in CCA's Waterbury, Conn. plant. He has been prominent for many years in both business and civic affairs there.

PHILIP W. PROUTY

A member of AES since 1928 and made an honorary member of Springfield Branch in 1958, Philip W. Prouty, 69, died on April 10, 1961.

Mr. Prouty attended AES meetings in Hartford until the Springfield Branch was formed in 1935, when he became one of its Charter Members. He served Springfield Branch in all the offices from librarian to president.

He was chosen as the Old Timer from Springfield Branch to be honored at "Old Timers Night" in Hartford on Saturday evening, February 11, following the AES's Eighth Interim Meeting, where he was presented an inscribed silver plated plate.

A native of Holyoke, Massachusetts and a graduate of Worcester Polytechnic Institute, he joined Westinghouse Electric Company in 1919. After 37½ years with that firm, he retired in 1956. During those years he developed practical applications, specifications and processes. He designed six new plating room layouts, and included semi-automatic and full automatic installations as they became available and practical.

Mr. Prouty was a registered professional engineer, also a member of the Engineering Society of Western Massachusetts and Westinghouse Veteran Employe Association. He leaves his wife, Allene, a son, two daughters, a sister and six grandchildren.

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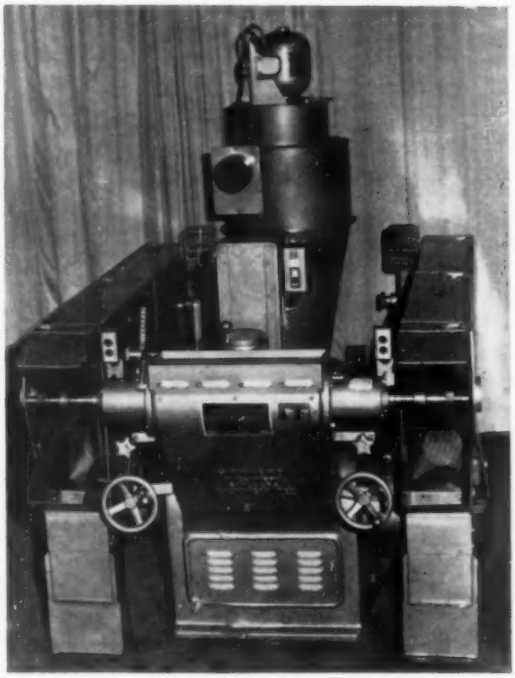

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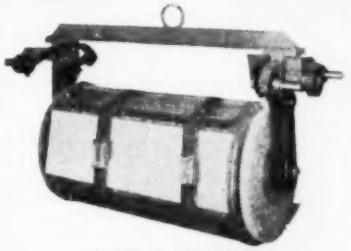

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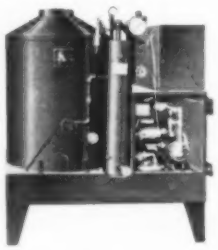

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AMERICAN ELECTROPLATERS' SOCIETY

July 22, 1961—**Detroit Branch Annual Stag Day,** Glen Oaks Country Club, Farmington, Mich.

August 19, 1961—**Cincinnati Branch Annual Picnic,** "The Farm," Anderson Ferry Road, Cincinnati, Ohio

December 1, 1961—**Melbourne Branch Annual Dinner,** Melbourne, Australia

December 1-2, 1961—**Detroit Branch Annual Educational Meeting and Banquet,** Statler-Hilton Hotel, Detroit, Mich.

Dec. 15-16, 1961—**Newark Branch Annual Educational Session and Banquet,** Robert Treat Hotel, Newark, N. J.

January 13, 1962—**Ninth Interim Meeting, Supreme Society,** Hotel Marott, Indianapolis, Ind.

January 20, 1962—**Grand Rapids Branch Annual Meeting,** Pantlind Hotel, Grand Rapids, Mich.

January 27, 1962—**Chicago Branch Annual Educational Meeting and Banquet,** Conrad Hilton Hotel, Chicago, Ill.

February 9-10, 1962—**Fourth Annual Dixie Regional Educational Meeting,** Dinkler-Plaza Hotel, Atlanta, Georgia

February 17, 1962—**New York Branch Annual Technical Session and Banquet,** Hotel Statler-Hilton, New York, N. Y.

March 2-3, 1962—**Philadelphia Branch Annual Educational Session and Banquet,** Benjamin Franklin Hotel, Philadelphia, Pa.

March 3, 1962—**Dayton Branch Annual Educational Session and Banquet,** Biltmore Hotel, Dayton, Ohio.

April 21, 1962—**23rd Annual New England Regional Meeting,** Hotel Statler, Hartford, Conn., Springfield Branch, Host.

May 1, 1962—**Central Michigan Branch,** Annual Educational Session and Banquet, Hotel Hayes, Jackson, Mich.

June 25-28, 1962—**49th AES Annual Convention,** Schroeder Hotel, Milwaukee, Wis. Sponsorship Midwest Regional Council.

June 24-27, 1963—**50th AES Annual Convention,** Ambassador Hotel, Atlantic City. N. J. Sponsorship Newark Branch.

June 15-18, 1964—**51st AES Annual Convention,** Sheraton-Jefferson Hotel, St. Louis, Missouri.

FUTURE MEETINGS

June 16-18, 1964—Sixth Industrial Finishing Exposition, St. Louis, Missouri.

June 28-July 1, 1965—52nd AES Annual Convention, Statler Hotel, New York, N. Y.

June 26-30, 1966—53rd AES Annual Convention, Hotel Fontainebleau, Miami, Florida. Dixie Regional Council, Sponsor. Southeastern Branch, Host.

INTERSOCIETY

July 31-Aug. 4, 1961—Gordon Research Conference on Electrodeposition, Tilton School, Tilton, N. H.

October 1-5, 1961—The Electrochemical Society, Fall Meeting, Hotel Statler, Detroit, Mich.

October 16-19, 1961—2nd International Congress on Vacuum Technology, Sheraton Park Hotel, Washington, D. C.

October 23-27, 1961—43rd National Metal Exposition & Congress, Cobo Hall, Detroit, Mich.

Jan. 30-Feb. 2, 1962—Society of Plastics Engineers, 18th Annual Technical Conference, Penn-Sheraton Hotel, Pittsburgh, Pa.

March 19-23, 1962—National Association of Corrosion Engineers, 18th Annual Conference, and Corrosion Show, Kansas City Auditorium, Kansas City, Mo.

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OFFICERS

Executive Secretary.....JOHN P. NICHOLS
443–445 Broad St., Newark, N. J.

The late June date of the AES's National Convention and the consequent late June date of the Annual Meeting of the Supreme Society at which 1961-1962 National Officers were elected, prevent identifying AES's elected 1961-1962 National Officers in this July 1961 issue. They will be listed in the August 1961 issue.

RESEARCH COMMITTEE

Secretary-Treasurer.....JOHN P. NICHOLS
443–445 Broad Street, Newark 2, N. J.

The 1961-1962 Research Committee Officers will be listed in the August 1961 issue of PLATING MAGAZINE. (See above under AES Officers).

1961-1962 COMMITTEE LEADERSHIP

To be announced in August 1961 and subsequent PLATING MAGAZINE issues.

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St. Louis: P. Lott
San Francisco: E. B. Leland, J. Curtiss, G. Winnick, J. Agostinetto

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Melbourne: A. Bennett, J. Anderson, I. Howell, J. Parkin, W. Rogers

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Detroit: W. Springer from Cleveland, H. Nice to Chicago
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Melbourne: K. Leigh to Sydney
Montreal: J. Supple from Indianapolis, H. Baka to Toronto
Newark: R. Schaefer from Cleveland, Dr. W. Duggins to Los Angeles
New Haven: W. Bridgett to Hartford, E. Castellano to Bridgeport
San Francisco: C. Kuster from New Haven

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Philadelphia: J. Eddowes, K. Kummer, Dr. W. Stericker
Saginaw Valley: J. Krato

SUSPENSIONS

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Chicago: E. Martin
Lancaster: J. Reigle
Newark: G. Ascione, H. Kelshaw, A. Bugna, C. Mueller, M. Bolembach

DEATHS

Melbourne: T. J. Bitmead, K. Voss
Montreal: J. Rennie
Newark: P. Travisino

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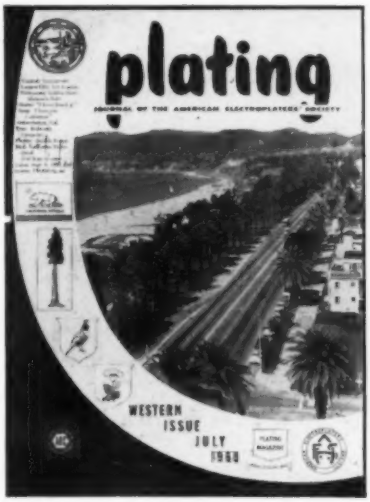

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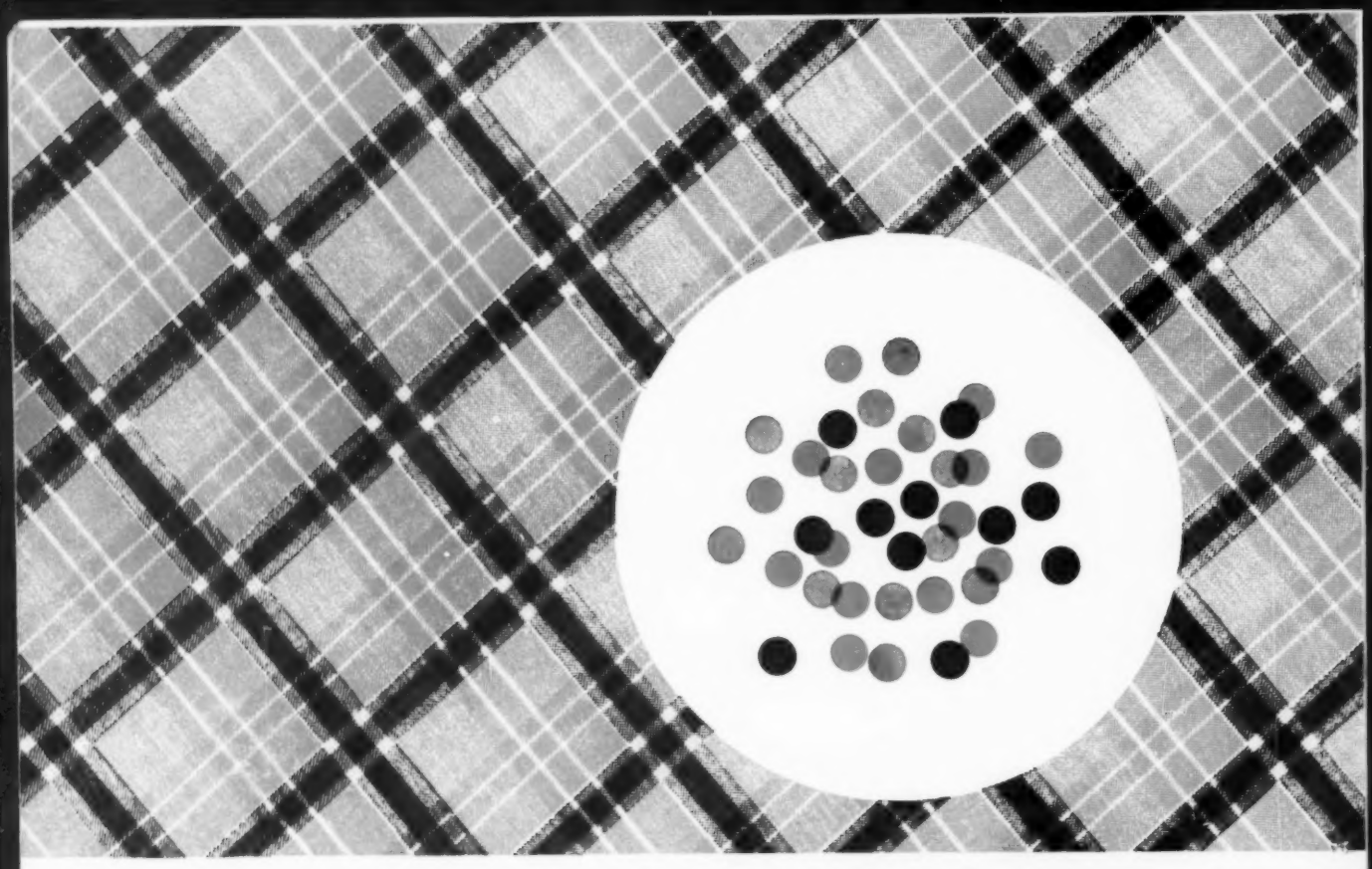

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